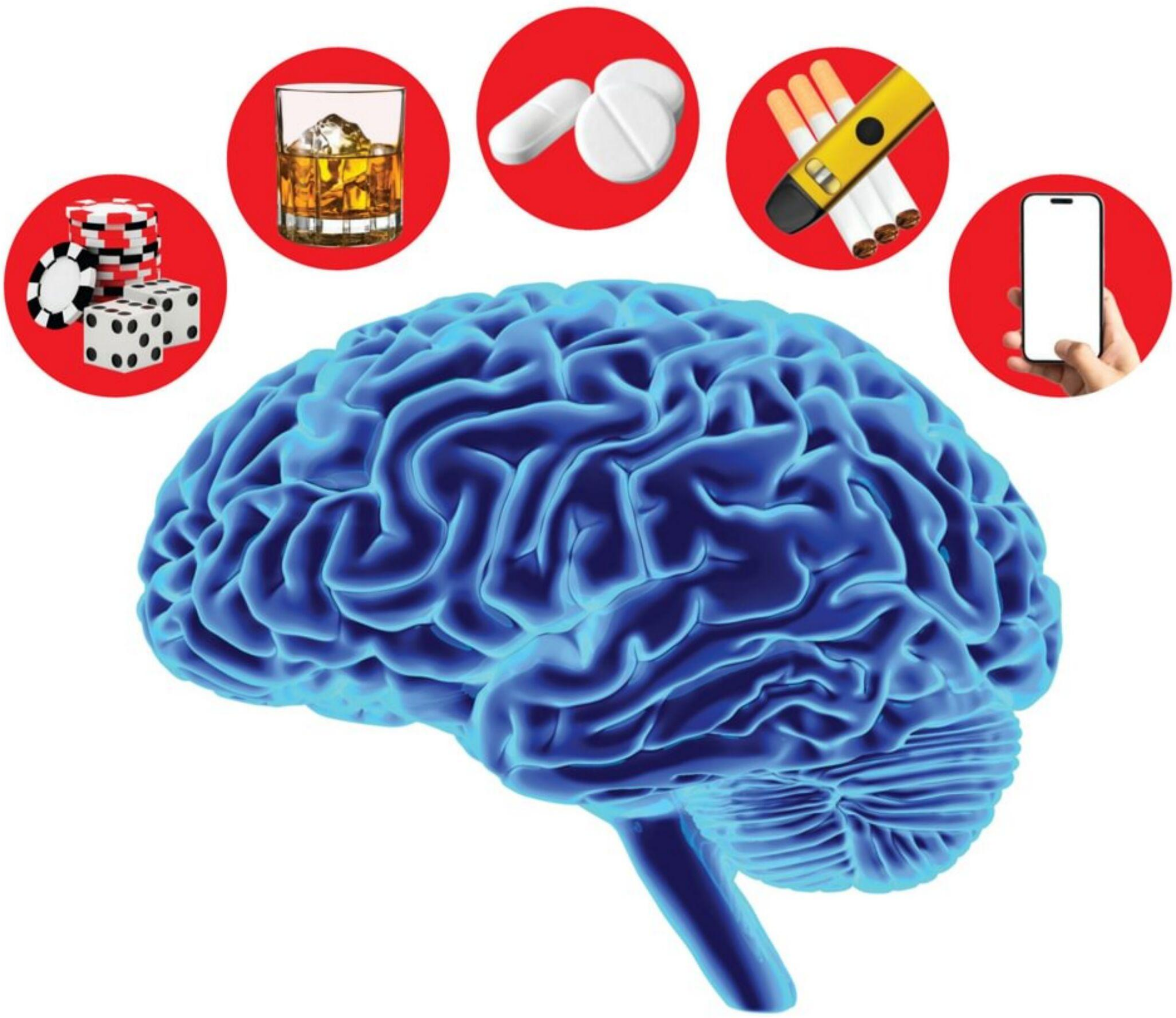
SPECIAL TIME EDITION

THE SCIENCE OF ADDICTION

What We Know. What We're Learning.

CONFRONTING AN EPIDEMIC | **SUPPORTING LOVED ONES** | **TREATMENT AND HOPE**



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CONTENTS

4 The Disease of the Pleasures

CHAPTER 1: THE ADDICTION

8 The Science of Addiction
14 What Hooks Us
16 Written in the Genes?
22 Compulsion Without the Chemicals
30 The Hunger That Can't Be Satisfied
33 Just How Addictive Is Caffeine, Anyway?
34 The New Scourge of Vaping
39 The Long History of Addiction
40 Addiction by Doctor's Prescription

CHAPTER 2: THE RESPONSE

48 Beyond the 12 Steps
53 How to Get the Cures to the Patients
54 Treatment at the Fringes
58 The Family Dilemma
65 The Dollars and Cents of Beating Addiction
66 A Father's Fight for His Son
70 The Opioid Diaries

CHAPTER 3: THE STORIES

78 Fictional Addicts, Real Pain
84 The Addicted Creative
90 Battling the Odds

Parts of this edition were previously published.

THE DISEASE OF THE PLEASURES

For as long as human beings have had ways to feel good, we've struggled to know when it's time to stop. By Jeffrey Kluger

YOUR BRAIN IS VERY SIMPLEMINDED—AND SO IS everyone else's. That's not the way we think of ourselves, of course. Great minds have produced great works over the long arc of human history—breakthroughs in art, science, engineering, exploration—and it takes no small amount of genius to accomplish so much.

But thinking big thoughts is only a fraction of what our brains do. Much of the rest is pretty primal stuff—regulating breathing, managing memory, interpreting sight and sound and touch and taste. It's the brain that puts us to sleep at night and runs the interior cinema that is our dreams.

The brain does another thing, too: It processes pleasure—the satisfaction of eating; the thrill of sex; the exhilaration of winning; the light, loopy, all-is-well feeling of being buzzed on drink or drugs. It's all just chemistry, this or that neurotransmitter engaging this or that receptor, sending a crackle of happiness along neuronal circuits that never knew such joy before the first time you downed a glass of beer or won a hand of poker or ingested an opioid. You'd heard other people describe the experiences, and now that you've had them yourself, you'd sure like to do it all again. And then again. And yet again. And that's where things can go awry.

There's a gravity to temptation, an attractive force that overcomes the friction of your resistance. There is not a person who ever cheated on a spouse who didn't feel that implacable pull, accelerating faster and faster toward the object of desire with the internal voice that counsels discipline and fidelity, the sanctity of the marriage vows getting fainter and fainter as it is left further and further behind. There's not a person who had a third or fifth or 10th drink, or gambled away the last dollar of this week's paycheck, or ate a second pint of ice cream who didn't surrender to the same inexorable power.

Sometimes we learn from those lost battles, with the hangover or the number on the scale or the heartbreak of a spouse being enough to set us right. Sometimes, however, there is no lesson learned, or at least no lesson heeded. Sometimes we're powerless to *not* repeat the behavior. Perhaps we intend to behave—we *promise* ourselves and the other people in our life that we'll behave—but we fail. The behavior becomes a habit, the habit becomes a compulsion, and the compulsion becomes the life-wrecking disease that is addiction.

The numbers are scary enough. In 2024, more than 80,000 Americans died of a drug overdose. That's nearly 220 people a day. Roughly 21 to 29

percent of people who are prescribed opioids for chronic pain wind up misusing them.

The COVID-19 pandemic might have been a force multiplier in those troubling numbers, with the lengthy lockdown and related stressors exacerbating the incidence of people seeking relief in addictive pharmacology. "The disruption to daily life due to the COVID-19 pandemic hit those with substance use disorder hard," said former Centers for Disease Control and Prevention director Robert Redfield, MD.

And opioids are hardly the only class of chemical that's taking such an awful toll. More than 48 million Americans 12 and older had some kind of substance-use disorder in 2023, according to the National Survey on Drug Use and Health. Among those, 7.5 million simultaneously battle both alcohol and drug-use disorders. And among Americans with mental-health disorders, 42 percent also have a substance-abuse problem—perhaps seeking relief from emotional pain in alcohol or pills, or perhaps pushed toward intoxicants by a simple lack of impulse control, which can be a symptom of mental-health conditions such as oppositional defiant disorder. Either way, they suffer doubly.

Chemicals, of course, are not the only thing that can draw us in and seize our will. The concept of behavioral addictions—to sex, online gaming, pornography, gambling, shopping, food—is controversial among addiction specialists. But brain scans of problem gamblers show the same regions lighting up that are affected in a person addicted to alcohol and drugs, driving the same cycle of craving, bingeing, remorse, and repeat.

No one knows the exact cause of addiction, or why some people are claimed by it while others can thread the needle of enjoying some indulgences but pulling up short before some becomes too much. Genes surely play a role, with studies showing, for example, that identical twins are far likelier to share addictions than fraternal twins. And availability matters. There are few shopping addicts in impoverished communities, few alcoholics in dry countries.

The path to treatment and recovery varies, but experts agree that it should be multifaceted and ongoing. Medications can help. The 12-step model works. The surgical intervention of deep brain stimulation may have a place. What is consistent about addiction from era to era has been the groping for a cure, the desperation to turn the brain back to a seat of pleasure. There are answers, but there is darkness to endure before the light breaks again. □

CHAPTER 1

The Addi

Addiction

The causes of addiction, like the individuals it affects, are complex and unique. But from behavioral fixations to chemical compulsions, the answers may lie in our brain, our genes, and the world around us.

THE SCIENCE OF ADDICTION

For a species wired for survival, we have an odd habit of getting hooked on things that can kill us. New research is revealing why—and opening the door to a long-dreamed-of cure. By Michael D. Lemonick

I WAS DRIVING UP THE MASSACHUSETTS TURNpike one evening many years ago when I knocked over a bottle of water. I grabbed for it, swerved inadvertently—and a few seconds later found myself blinking into the flashlight beam of a state trooper. "How much have you had to drink tonight, sir?" he demanded. Before I could help myself, I indignantly blurted out an answer that was surely a new one to him: "I haven't had a drink since 1981."

It was both perfectly true and pertinent to the trip I was making. By the time I reached my late 20s, I'd poured down as much alcohol as normal people consume in a lifetime, and plenty of drugs—mostly pot—as well. I was, by any reasonable measure, an active alcoholic. Fortunately, with a lot of help, I was able to stop. And now I was on my way to McLean Hospital in Belmont, Massachusetts, to have my brain scanned in a functional magnetic resonance imager (fMRI). The idea was to see what the inside of my head looked like after more than a quarter-century on the wagon.

Back when I stopped drinking, such an experiment would have been unimaginable. At the time, the medical establishment had come to accept the idea that alcoholism was a disease rather than a moral failing. The American Medical Association (AMA) had said so in 1956. But while it had all the hallmarks of other diseases, including specific symptoms and a predictable course, leading to disability or even death, alcoholism was different. Its physical basis was a complete mystery—and since nobody forced alcoholics to drink, it was still seen, no matter what the AMA said, as somehow voluntary. Treatment consisted mostly of talk therapy, maybe some vitamins, and usually a strong recommendation to join Alcoholics Anonymous (AA). Founded in 1935 by an ex-drunk and an active drinker, AA has managed to get millions of people off the bottle using group support and a program of accumulated wisdom.

Although AA is astonishingly effective for many people, it doesn't work for everyone, and the program's success is hotly debated. However, a 2020 Cochrane review determined a 42 percent success rate, which was much higher than previously thought. (Insurers and policy makers often rely on Cochrane reviews, which are considered the gold standard for evaluating health research.) Other forms of treatment, including various types of behavioral therapy, don't do that well. The rate is no better with drug addiction, which experts see as the same disorder triggered by a different chemical. "The sad part is that if you look at where addic-

Scientists use fMRIs and PET scans to study how addiction can affect the brain.

tion treatment was years ago, it hasn't gotten much better," says Martin Paulus, MD, a former professor of psychiatry at the University of California, San Diego, and now president of the Laureate Institute for Brain Research in Tulsa, Oklahoma. "You have a better chance to do well after many types of cancer than you have of recovering from methamphetamine dependence."

But in recent years, researchers have made extraordinary progress in understanding the physical basis of addiction. They now know, for example, that success rates can shoot up to 60 percent if treatment is ongoing (very much the AA model, which is most effective when members continue to attend meetings long after their last drink). Armed with an array of increasingly sophisticated technology, including fMRIs and PET scans, investigators have begun to figure out exactly what goes wrong in the brain of an addict—which neurotransmitting chemicals are out of balance and what regions of the brain are affected. They are developing a more detailed understanding of how deeply and completely addiction can affect the brain by hijacking memory-making processes and by exploiting emotions. Using that knowledge, they've begun to design new drugs that could cut off the craving that drives an addict irresistibly toward relapse—the greatest risk facing even the most dedicated abstainer.

Addiction is defined as a chronic relapsing behavior in the face of negative consequences—the overwhelming urge to continue something that is bad for you. It is such a harmful behavior, in fact, that evolution should have long ago weeded addiction out of the population: If it's hard to drive safely under the influence, imagine trying to run from a saber-toothed tiger or catch a squirrel for lunch. "And yet," says Nora Volkow, MD, director of the National Institute on Drug Abuse (NIDA) at the National Institutes of Health and a pioneer in the use of imaging to understand addiction, "the use of drugs has been recorded since the beginning of civilization. Humans, in my view, will always want to experiment with things to make them feel good."

That's because drugs of abuse co-opt the very brain functions that allowed our distant ancestors to survive in a hostile world. Our minds are programmed to pay extra attention to what neurologists call salience—that is, special relevance. Threats, for example, are highly salient, which is why we instinctively try to get away from them. But

Nora Volkow, director of the National Institute on Drug Abuse, studies the neurological roots of addiction.

so are food and sex, because they help the individual and the species survive. Drugs of abuse capitalize on this ready-made programming. When exposed to drugs, our memory systems, reward circuits, decision-making skills, and conditioning kick in—salience in overdrive—to create an all-consuming pattern of uncontrollable craving. "Some people have a genetic predisposition to addiction," says Volkow. "But because it involves these basic brain functions, everyone will become an addicted person if sufficiently exposed to drugs or alcohol."

That can go for nonchemical addictions as well. Behaviors from gambling to shopping to sex may start out as habits but slide into compulsions. Sometimes there might be a behavior-specific root of the problem. Volkow's research group, for example, has shown that pathologically obese people who are compulsive eaters exhibit hyperactivity in the areas of the brain that process food stimuli, including the mouth, lips and tongue. For them, activating these regions is like opening the floodgates to the pleasure center. Almost anything deeply enjoyable has the potential to become addictive, though.

Of course, not everyone becomes addicted. That's because there are other, more analytical brain regions that can evaluate consequences and override mere pleasure-seeking. Brain imaging is showing exactly how that happens. Paulus, for example, looked at people addicted to methamphetamine who were enrolled in a VA hospital's intensive four-week rehabilitation program. Those who were more likely to relapse in the first year after completing the program were also less able to complete tasks involving cognitive skills and less able to adjust to new rules quickly. This suggested that those patients might also be less adept at using analytical areas of the brain while performing decision-making tasks. Sure enough, brain scans showed that there were reduced levels of activation in the prefrontal cortex, where rational thought can override impulsive behavior. It's impossible to say if the drugs might have damaged these abilities in the relapsers—an effect rather than a cause of the chemical abuse—but the fact that the cognitive deficit existed in only some of the meth users suggests that there was something innate that was unique to them. To his surprise, Paulus found that, 80 to 90 percent of the time, he could accurately predict who would relapse within a year simply by examining the brain scans.

ALMOST ANYTHING DEEPLY ENJOYABLE HAS THE POTENTIAL TO BE ADDICTIVE.

Another area of focus for researchers involves the brain's reward system, powered largely by the neurotransmitter dopamine. Investigators are looking specifically at the family of dopamine receptors that populate nerve cells and bind to the compound. The hope is that if the effect of the brain chemical that carries the pleasurable signal can be dampened, the drug's hold can be loosened.

One particular group of dopamine receptors, called D3, seems to multiply in the presence of cocaine, methamphetamine, and nicotine, making it possible for more of the drugs to enter and activate nerve cells. "Receptor density is thought to be an amplifier," says Frank Vocci, PhD, formerly with NIDA and now a senior research scientist at Friends Research Institute in Baltimore. "[Chemically] blocking D3 interrupts a lot of the drugs' effects. It is probably the hottest target in modulating the reward system."

But just as there are two ways to stop a speeding car—by easing off the gas or by hitting the brake pedal—there are two different possibilities for mutating addiction. If dopamine receptors are the gas, the brain's own inhibitory systems act as the brakes. In people with addictions, this natural damping circuit, called GABA (gamma-aminobutyric acid), appears to be faulty. Without a proper chemical check on excitatory messages set off by drugs, the brain never appreciates that it's been satiated.

As it turns out, vigabatrin, an antiepilepsy treatment, is an effective GABA booster. In epileptics, vigabatrin suppresses overactivated motor neurons that cause muscles to contract and go into spasm. In animals, vigabatrin prevents the breakdown of GABA so that more of the inhibitory compound can be stored in whole form in nerve cells. That way, more of it can be released when those cells are activated by a hit from a drug. Biotech companies in the U.S. have been researching the drug's effect on cocaine and alcohol use in the hopes that enhancing GABA in the brains of addicted people would help control their cravings. Preclinical evidence suggests the drug may be effective in reducing cocaine and alcohol intake.

Another fundamental target for addiction treatments is the stress network. Animal studies show that stress can increase the desire for drugs. In rats trained to self-administer a substance, stressors such as a new environment, an unfamiliar cage mate, or a change in routine lead to more substance use.

Among higher creatures like us, stress can also alter the way the brain thinks, particularly the way it contemplates the consequences of actions. Recall the last time you found yourself in a stressful situation, when you felt scared, nervous, or threatened. Your brain tuned out everything besides whatever it was that was frightening you—the familiar fight-or-flight mode. "The part of the prefrontal cortex that is involved in deliberative cognition is shut down by stress," says Vocci. "It's supposed to be. But it's even more inhibited in chronic substance users." A less responsive prefrontal cortex sets up people with addictions to be more impulsive as well.

Sex hormones may also play a role in how people become addicted. Studies have shown, for instance, that women may be more vulnerable to cravings for nicotine during the latter part of their menstrual cycle, when the hormones progesterone and estrogen are released. "The reward systems of the brain

have different sensitivities at different points in the cycle," notes Volkow. "There is way greater craving during the later phase."

That led researchers to wonder about other biological differences in the way men and women become addicted and, significantly, respond to treatments. Alcohol dependence is one very promising area. For years, researchers had documented the way female alcoholics tend to progress more rapidly to alcoholism than men do. This telescoping effect, they now know, has a lot to do with the way women metabolize alcohol. Females produce less alcohol dehydrogenase—the first enzyme in the stomach lining that starts to break down the ethanol in liquor—and less total body water than men. Along with estrogen, these factors have a net concentrating effect on the alcohol in the blood, giving women a more intense hit with each drink. The pleasure from that extreme high may be enough for some women to feel satisfied and therefore drink less. For others, the intense intoxication is so enjoyable that they try to duplicate the experience over and over.

But it's the brain, not the gut, that continues to get most of the attention, and one of the biggest reasons is technology. It was in 1985 that Volkow first began using PET scans to record trademark characteristics in the brains and nerve cells of chronic drug users, including blood flow, dopamine levels, and glucose metabolism—a measure of how much energy is being used and where (and therefore a stand-in for figuring out which cells are at work). After the subjects had been abstinent for a year, Volkow rescanned their brains and found that they had begun to return to their pre-drug state. Good news, certainly, but only as far as it goes.

"The changes induced by addiction do not just involve one system," says Volkow. "There are some areas in which the changes persist even after two years." One area of delayed rebound involves learning. Somehow, in chronic methamphetamine users, the ability to learn some new things remained affected after 14 months of abstinence. "Does treatment push the brain back to normal," asks Joseph Frascella, a former senior science adviser for NIDA and now the chief clinical research officer for Florida State University and Tallahassee Memorial Health, "or does it push it back in different ways?"

If the kind of damage that lingers in an addicted person's learning ability also hangs on in behavioral areas, this could explain why rehabilitation programs that rely on cognitive therapy—teaching new ways to think about the need for a substance and the consequences of using it—might not be effective, especially in the first weeks and months after getting clean. "Therapy is a learning process," notes Vocci. "We are trying to get [addicts] to change cognition and behavior at a time when they are least able to do so."

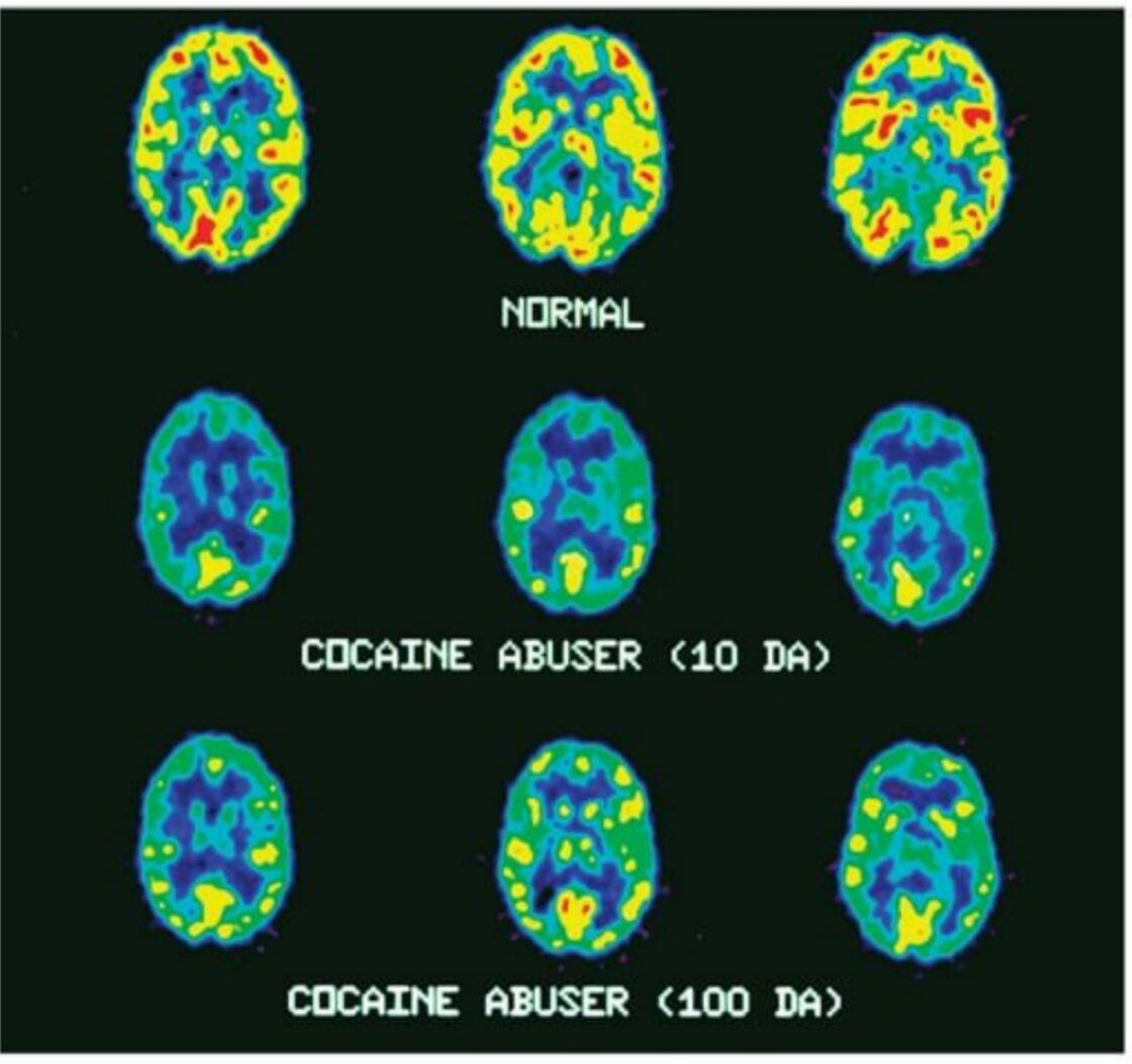
One important discovery: Evidence supports the 90-day rehabilitation model, which is part of AA (new members are advised to attend a meeting a day for the first 90 days) and is a recommended duration of a stint in a drug-treatment program. It turns out that this is just about how long it takes for the brain to reset itself and shake off the immediate influence of a drug. Researchers at Yale University have documented what they call the sleeper effect—a gradual reengagement of proper decision-making and analytical functions in the brain's prefrontal cortex—after an addict has abstained for at least 90 days.

THERE ARE HINTS THAT, IN PRINCIPLE, A CURE MIGHT NOT BE IMPOSSIBLE.

This work has led to research on cognitive enhancers, or compounds that may amplify connections in the prefrontal cortex to speed up the natural reversal. Such enhancement would give the higher regions of the brain a fighting chance against the amygdala, a more basal region that plays a role in priming the dopamine reward system when certain cues suggest imminent pleasure—anything from the sight of white powder that looks like cocaine to spending time with friends you used to drink with. It's that conditioned reflex that unleashes a craving. And it's that phenomenon that was the purpose of my brain scans at McLean Hospital.

In my earlier years, I would often drink even when I knew it was a terrible idea—and the urge was hardest to resist when I was with my drinking buddies, hearing the clink of glasses and bottles, seeing others imbibe, and smelling the aroma of wine or beer. The researchers at McLean have invented a machine that wafts such odors directly into the nostrils of a subject undergoing an fMRI scan in order to see how the brain reacts. The reward circuitry in the brain of a newly recovering alcoholic should light up like a Christmas tree when stimulated by one of these alluring smells.

From their impressive stock, I chose dark beer,



PET scans show low brain activity (yellow and red) 10 days after cocaine use; at 100 days, the brain is recovering.

my absolute favorite. But I hadn't gotten high for more than 25 years; it was an open question how I would react to the scent of what gave me so much enjoyment back then. So after an interview with a staff psychiatrist to make sure I would be able to handle it if I experienced a craving, I was fitted with a tube that carried beer aroma from a vaporizer into my nose. I was then slid into the machine to inhale that still familiar odor while the fMRI did its work.

Even if the smells triggered a strong desire to drink, I had long since learned ways to talk myself out of it—or find someone to help me do so. Like the 90-day drying-out period that turns out to parallel the brain's recovery cycle, such a strategy is in line with other new theories of addiction. Scientists say extinguishing urges is not a matter of getting the feelings to fade but of helping the addict learn a new form of conditioning, one that allows the brain's cognitive power to shout down the amygdala and other lower regions. "What has to happen for that cue to extinguish is not for the amygdala to become weaker but for the frontal cortex to become stronger," says Vocci.

While such relearning has not been studied formally in humans, Vocci believes it will work, on the basis of studies involving phobias. It turns out that phobias and drugs exploit the same struggle between high and low circuits in the brain. People placed in a virtual-reality glass elevator and treated with the antibiotic D-cycloserine—originally used to treat tuberculosis but now known to help quiet the amygdala—were better able to overcome their fear of heights than those without benefit of the drug. Says Vocci, "I never thought we would have drugs that affect cognition in such a specific way."

Such surprises have even allowed experts to speculate whether addiction can be cured. That notion goes firmly against current beliefs. A rehabilitated addict is always in recovery because "cured" suggests that resuming the behavior is a safe possibility. But there are hints that, in principle, a cure might not be impossible. One study showed that tobacco smokers who suffered a stroke that damaged the insula (a region of the brain involved in emotional, gut-instinct perceptions) no longer felt a desire for nicotine.

That's exciting, but because the insula is so critical to other brain functions—perceiving danger, anticipating threats—damaging this area isn't something you would ever want to do intentionally. With so many of the brain's systems entangled with one another, it could prove impossible to adjust one without throwing the others into imbalance.

Nevertheless, says Volkow, "addiction is a medical condition. We have to recognize that medications can reverse the pathology of the disease. We have to force ourselves to think about a cure, because if we don't, it will never happen." But she is quick to admit that just contemplating new ideas doesn't make them so. The brain functions that addiction commandeers may simply be so complex that addicts never lose their vulnerability to their drug of choice.

Inside the fMRI at McLean, my brain barely lit up in response to the smell of beer. "This is valuable information for you as an individual," said Scott Lukas, PhD, director of the hospital's brain-imaging center and a professor of psychiatry at Harvard Medical School, who ran the tests. "It means that your brain's sensitivity to beer cues has long passed."

That's in keeping with my real-world experience. If someone has a beer at dinner, I don't feel a compulsion to leap over the table and grab it, or to order one for myself. Does that mean I'm cured? It might simply mean it would take a much stronger trigger for me to fall prey again—for example, downing a glass of beer. The last thing I intend to do is put that theory to the test. I've seen too many others try it—with horrifying results. ◻

—Additional reporting by Alice Park

What Hooks Us

U.S. addiction trends have changed over time. Here's a look at what we're battling now.

SUBSTANCE AND BEHAVIORAL ADDICTIONS

Alcohol

About 16.4 million people, or 5.8 percent of the population, are dependent on or abuse alcohol, and 13,000 more try it for the first time every day. Alcoholics Anonymous has more than 2 million members—only a small fraction of those who need help.

Drugs

An estimated 8.9 million people are dependent on at least one drug. On average, 27,000 try them for the first time each day. Marijuana, prescription pain relievers, and prescription tranquilizers are the drugs most often abused. In 2023, 12.8 million people received treatment for the use of drugs and/or alcohol.

Tobacco

There are about 49.9 million users of tobacco products in the U.S., including cigarettes and e-cigarettes. Cigarette use is lowest in Western states and highest in the Midwest. While youth are smoking fewer cigarettes, roughly 6 percent of school-aged students are now vaping.

Caffeine

The most widely used mood-altering drug in the world is ingested by about 80 to 90 percent of Americans, primarily through soda and coffee. A daily brewed cup of joe, with 100 milligrams of caffeine, can lead to mild physical dependence. About half of those trying to quit experience withdrawal symptoms.

Food

Although food addiction is not a classifiable disorder, as much as 20 percent of the population may fit the criteria. Food addiction also has some overlap with binge-eating disorder (which is classified) in that it affects women much more than it does men and is linked to depression.

Gambling

Approximately 2.5 million people, or 1 percent of the adult U.S. population, have a gambling disorder, wagering heedless of the consequences. In treatment populations, about half of those with a gambling disorder have suicidal ideation, and 17 percent have attempted suicide.

Shopping

Research indicates that about 6 percent of the U.S. population are compulsive buyers, and women are nine times as likely to be affected as men. The accessibility of online shopping is thought to have fueled a worldwide surge in this wallet-draining addictive activity.

Sex

Some 3 to 6 percent or 7.4 million to 14.7 million of American adults struggle with what has recently been classified as compulsive sexual behavior disorder. Online porn addiction has escalated in recent years. Excessive masturbation and other obsessive thoughts and behaviors often have a strong correlation with childhood trauma.

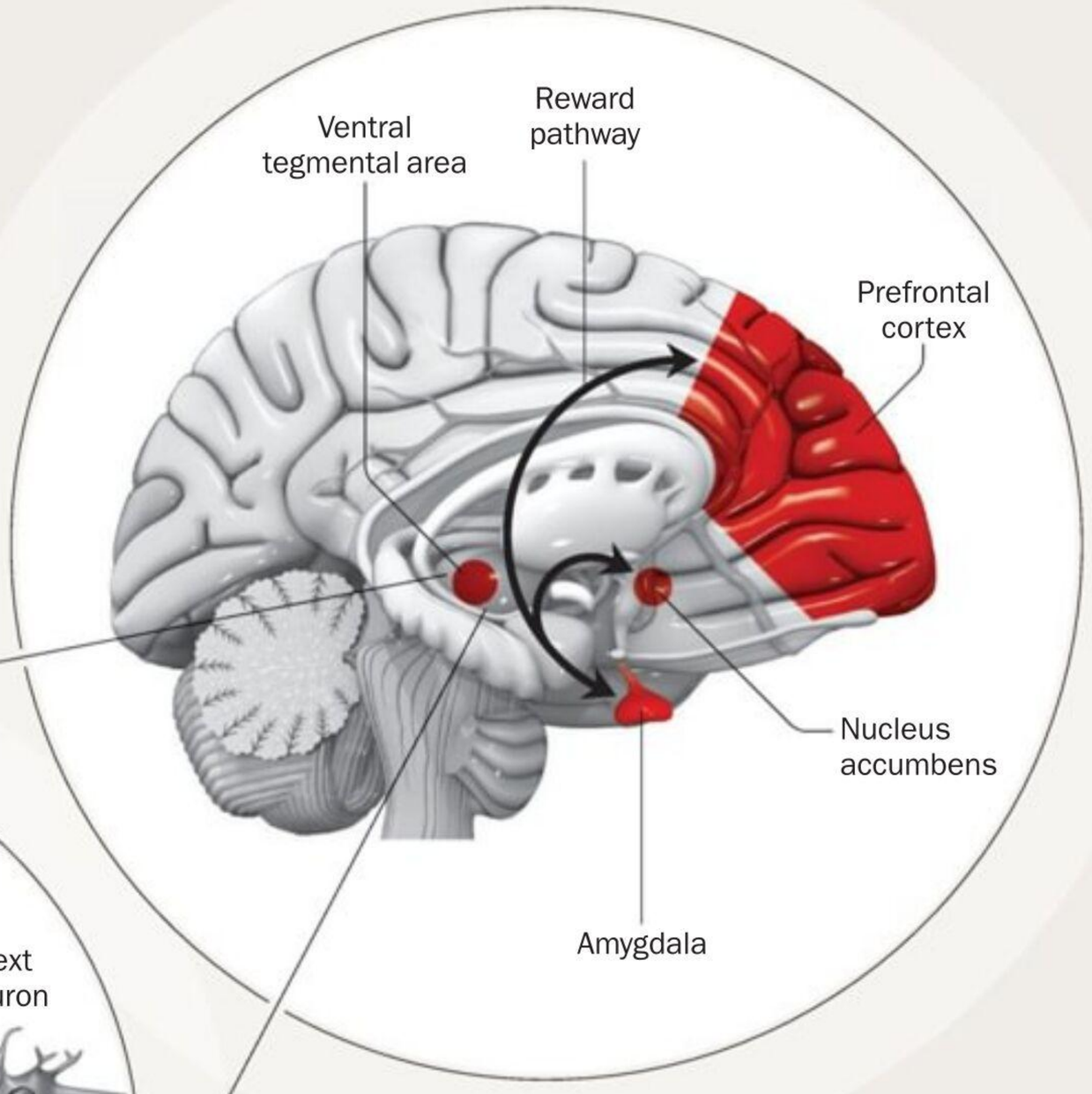
Internet

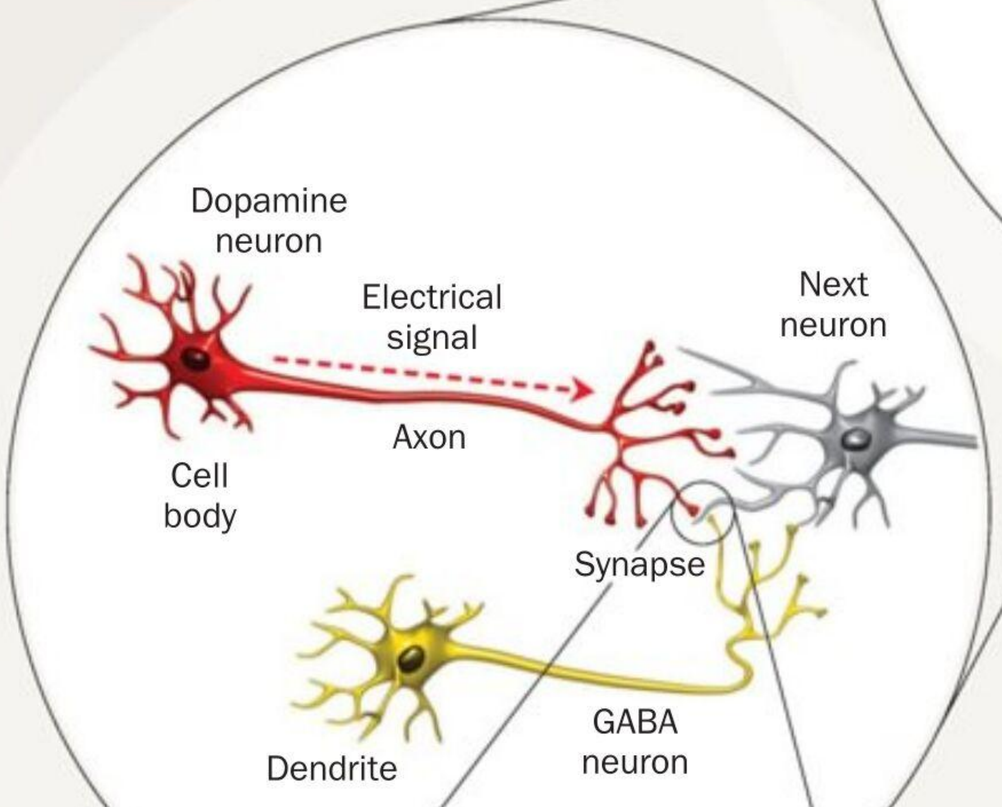
With 90 percent of children and teens and 65 percent of adults playing online and video games regularly, *DSM-5* includes online gaming disorder not as a diagnosis but a condition warranting further research. Studies indicate some heavy users develop dysfunctional symptoms that cause social, work, and emotional impairment.

WHAT HAPPENS IN THE BRAIN

1

We feel good when neurons in the reward pathway release a neurotransmitter called dopamine into the nucleus accumbens and other brain areas.





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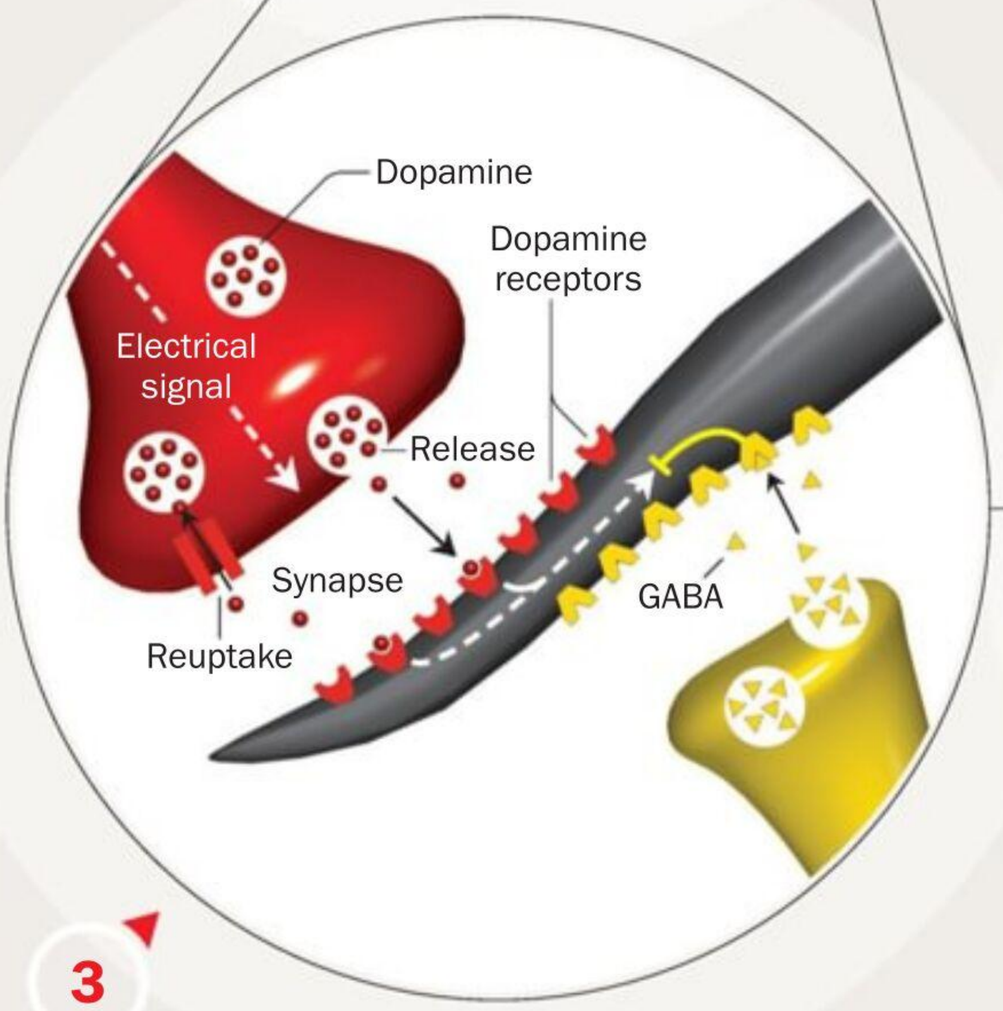
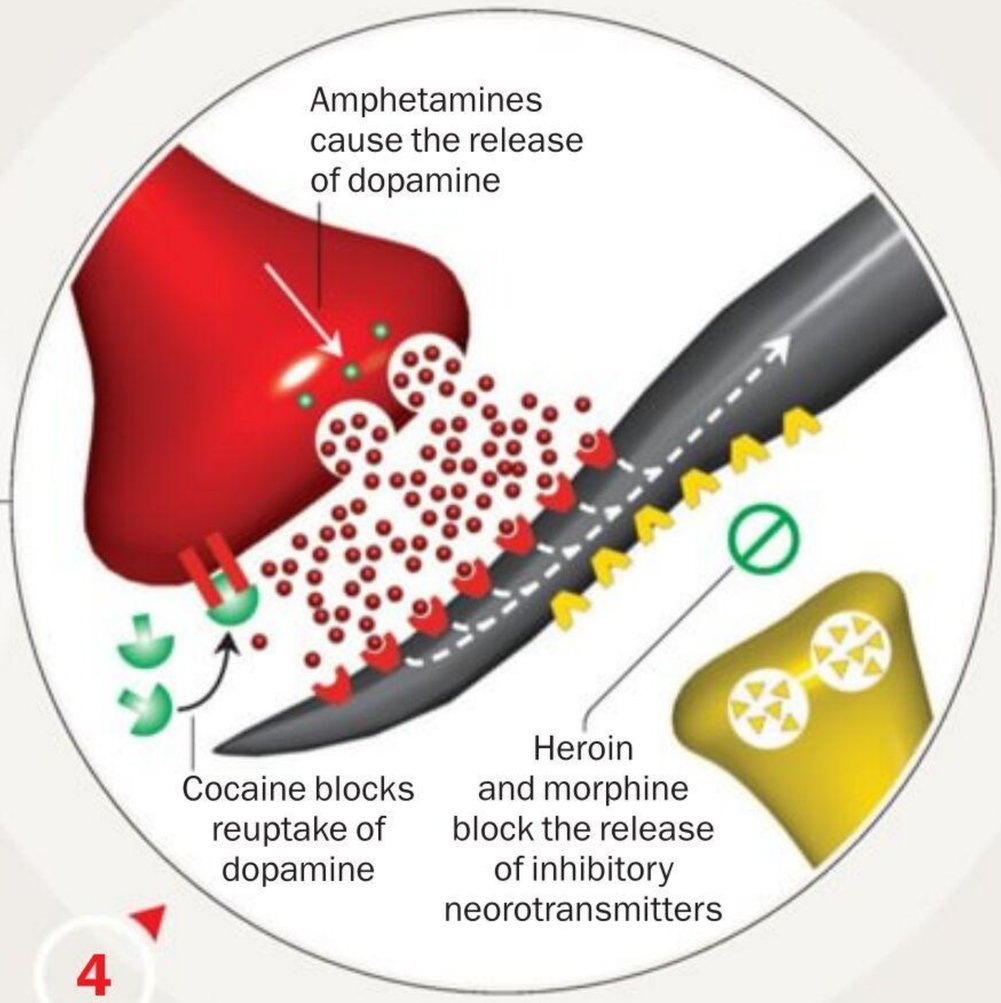
Neurons in the reward pathway communicate by sending electrical signals down their axons. A signal is passed to the next neuron across a small gap called the synapse.



3

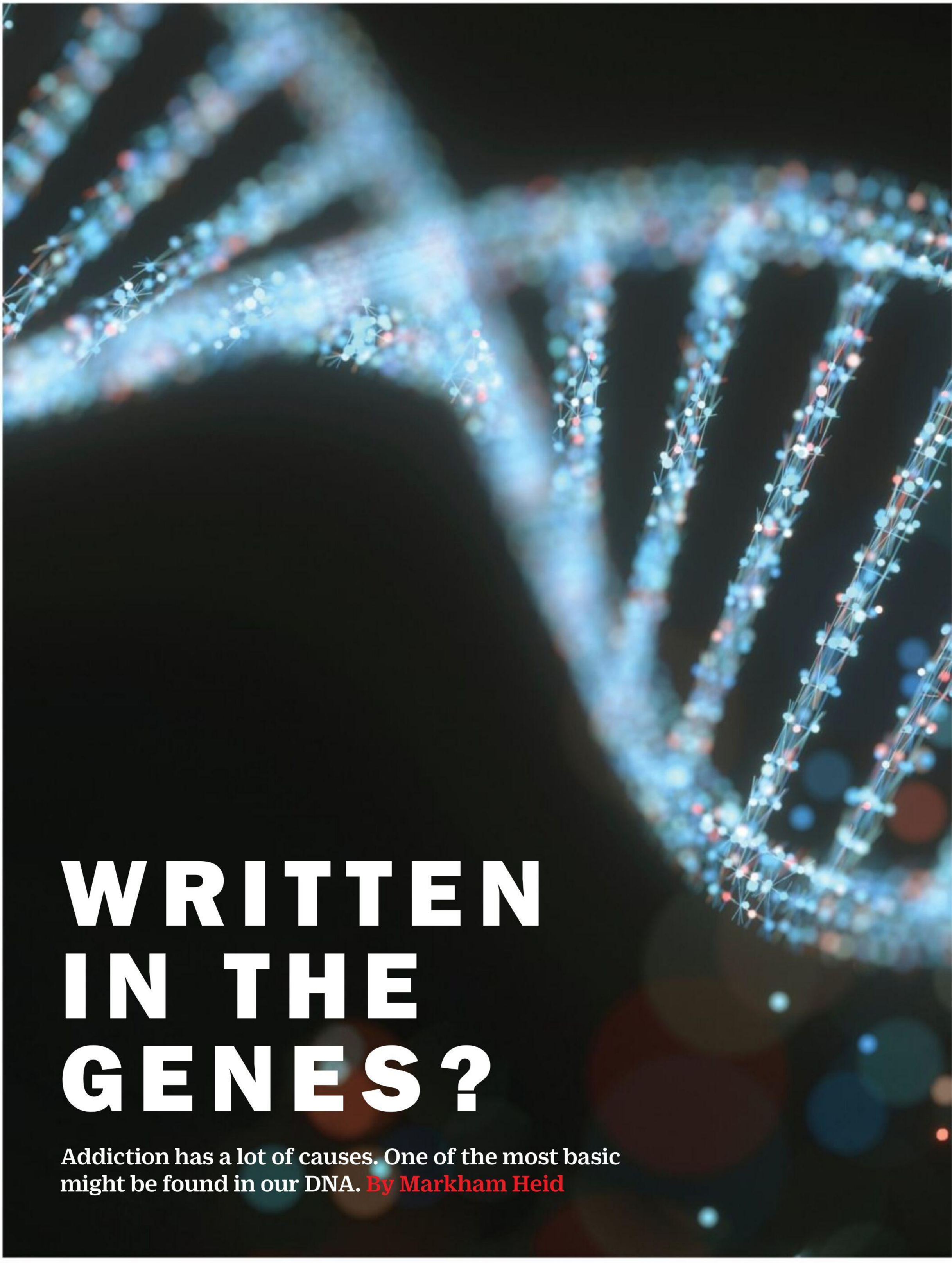
Dopamine is released into the synapse, crosses to the next neuron, and binds to receptors, providing a jolt of pleasure. Excess dopamine is taken back up by the sending cell. Other nerve cells release GABA, an inhibitory neurotransmitter that works to prevent the receptor nerve from being overstimulated.



4

Addictive substances increase the amount of dopamine in the synapse, heightening the feeling of pleasure. Addiction occurs when repeated drug use disrupts the normal balance of brain circuits that control rewards, memory, and cognition, ultimately leading to compulsive drug-taking.

SOURCE: NATIONAL INSTITUTE ON DRUG ABUSE (NIH). TIME DIAGRAM BY KRISTINA DELL, MEG MASSEY AND JOE LERTOLA



WRITTEN IN THE GENES?

Addiction has a lot of causes. One of the most basic might be found in our DNA. By Markham Heid

DNA plays a major role in determining how susceptible someone may be to addiction.

FOR CENTURIES, THE NATURE-VERSUS-NURTURE debate cast a long shadow over the study of human behavior, including the phenomenon of addiction. Are addicted people the product of their biology, or are their compulsions shaped by their experiences and environment? Why do some people mess with highly addictive substances at all while others avoid them entirely? Great minds were split over these questions.

Today, the debate is largely settled—though there is no clear victor. Experts now recognize that every human being is the product of both DNA and environment, which interact in endlessly complex ways to produce any number of outcomes. That's not to say the ratio of genetics to environment is the same from person to person. Just as one person's genetic risk for heart disease or diabetes differs from another's, not everyone's risk for addiction is the same. Researchers have identified specific genetic variables that, in some cases, can substantially raise or lower the likelihood that someone will merely experiment with addictive substances or go on to develop an addiction. And even for people who don't carry these specific high-risk genes, DNA still plays a significant role in shaping their propensity for developing an addiction disorder.

How significant? In 1999, a large study on male identical and fraternal twins appeared in the *American Journal of Psychiatry*. While identical twins share the same DNA, fraternal twins each have their own genetic blueprint and are no more alike in that respect than any other two siblings. The study found that alcohol-use disorders tended to show up much more commonly in both members of identical-twin pairs than in fraternal-twin pairs. Based on this finding and their subsequent analysis, the study authors determined that between 48 and 58 percent of a man's risk for an alcohol-use disorder is dependent on genetic variables, while the remainder of his risk comes down to environmental factors. With illicit drugs, genes are likely even more significant. The results are all but certainly applicable to women too, though perhaps not in the same percentages.

Figures like these apply to the "average" person. For a given individual, "we know that both genetic and environmental factors make important contributions to addiction," says Arpana Agrawal, PhD, an addiction researcher and a professor of psychiatry at Washington University School of Medicine in St. Louis. Teasing apart the ways DNA affects a person's risk for addiction has proved to be immensely challenging. For one thing, it's very unusual for a single gene variant—which is basically a snippet of genetic material—to play a decisive role in determining the risk for any disease. "We anticipate there are thousands of variants that contribute to genetic susceptibility for addiction," Agrawal says.

Genes and gene variants work in concert, not in isolation, and each may have an effect on the operation of all the others. Think of them as billiard balls caroming off one another to produce a particular pattern, except in a far more orderly way. For this reason, identifying a single addiction-related gene usually isn't enough to estimate its role in a person's risk for a substance disorder.

But there are exceptions.

PATHWAYS TO ADDICTION

THE HUMAN GENOME, WHICH IS A PERSON'S COMplete genetic blueprint, contains up to 25,000 genes. And from one person to the next, more than 99 percent of the genetic sequences that comprise these genes are identical. It's the variation in the less than 1 percent that determines a person's unique traits—from height to eye color to the way the brain processes information.

Much of the research into the ways genetic variations may fuel or dampen addiction has focused on alcohol use. "This is because alcohol dependence is the most prevalent [form of substance abuse], and the biggest killer," says Danielle Dick, PhD, an addiction researcher and director of the Rutgers Addiction Research Center at Rutgers University. She says researchers have identified a handful of genes that have big effects.

"IT'S UNUSUAL THAT A SINGLE GENE CAN PLAY A BIG ROLE IN A PERSON'S RISK."
—Danielle Dick, PhD

Some of these genes affect enzymes referred to as alcohol dehydrogenase (ADH) and aldehyde dehydrogenase (ALDH). Both of these enzymes play a role in the way the human body metabolizes ethanol, which is pure alcohol. "When our body breaks down alcohol, it first converts it to acetaldehyde, which is a nasty by-product," Dick explains. According to the National Institute on Alcohol Abuse

and Alcoholism, acetaldehyde is a "highly toxic substance" that can cause short-term symptoms such as skin flushing and nausea and that in the long term can promote liver damage and cancer.

"Usually, acetaldehyde is quickly broken down into acetate," which is then eliminated from the body, Dick says. But for people who carry certain gene variants—also known as polymorphisms—related to ADH or ALDH, the body's normal alcohol-breakdown processes are altered. For example, some people who carry an ALDH gene polymorphism have low levels of the enzymes that turn acetaldehyde into acetate. This causes acetaldehyde to build up quickly and induce those short-term symptoms. (Dick says this particular polymorphism is mostly limited to people of East Asian descent.) In others, the presence of one of these polymorphisms causes a rapid increase in the breakdown of alcohol to acetaldehyde, which can also make a person feel unwell. "If you feel sick when you drink, you tend not to develop a problem," she points out. And so individuals who carry one of these genetic variants are at lower risk than the average person for an alcohol-use disorder.

But even here, Dick stresses, "it's unusual that a single gene can play a big role in a person's risk. And, as it turns out, the way a person's body responds to a drug is really just a tiny part of the influence genes have on addiction." She says most of the strong links between addiction and a person's DNA have to do with two different "genetically influenced pathways" that broadly affect how the human brain processes risk, reward, and emotion.

The first of these is usually referred to as the externalizing pathway, and it's used to describe individuals who engage in behaviors that are impulsive or risky. "These are people who were born with brains wired for sensation-seeking and reward-seeking, and they don't stop to think about their actions or the consequences of their actions as much as others," Dick explains. They are more likely to end up in risky environments, and they're also more likely to try addictive substances and to develop problems.

The second pathway is known as the internalizing pathway. "This one has to do with the way our brains are wired to cope with fear and negative emotion," Dick says. Research from the University of North Carolina has found that people who are genetically predisposed toward internalizing are at greater risk for depression and anxiety. And studies have found that specific genetic variants that are associated with internalizing are predictive of greater risk for substance-use disorders. "Individuals who are more genetically predisposed this way often use substances to cope or to manage emotions," Dick says.

To some extent, these pathways exist in everyone. But our individual DNA helps determine where we fall along each, which in turn helps to determine our

liability for addiction. Scoring high on both scales would likely place you at particularly acute risk, but Dick hastens to add that neither one of them is innately bad. "We know entrepreneurs and CEOs tend to be more risk-taking and sensation-seeking," she says. "There are ways to channel these sorts of impulses toward constructive activities."

Also, individual life experience and environment can mediate both pathways. "Even if you have all the high-risk genetic variables, that doesn't mean you will develop a disorder," Dick says. For example, some cultures and religious communities don't engage in alcohol consumption or drug use, so many of their members are never exposed to these addictive substances. "Also, people who come from a family where the parent has an addiction may choose not to drink or use, and so they never develop a problem," Dick says.

A COMPLICATED PICTURE

A THIRD VARIABLE—SOMETHING THAT OVERLAPS with environment and genetics—also plays a part in a person's risk for addiction: timing.

"I mention young people a lot, because if we're talking about risk for substance abuse, we know most people start using during adolescence and emerging adulthood," Dick says. This has to do somewhat with genetics but more so with the way a young person's mind matures.

"During adolescence, the parts of the brain that process reward are highly developed, which means adolescents like to engage in reward-seeking," she says. At the same time, the parts of the brain that are not as fully developed—such as the prefrontal cortex—are the ones that help a person think through the long-term consequences of choices. Thus, to every parent's chagrin, "adolescents have brains that are hardwired to get them into trouble," Dick says. This means the environments a young person ends up in, the friends who are there, and the substances that are available there really matter.

Research in the journal *JAMA Psychiatry* has determined that, when it comes to a young person's risk for developing an alcohol-use disorder, environmental influences play a larger role than genetics. But this balance flips during adulthood. Once people reach their mid-20s, approximately, genetic factors seem to take the wheel and drive the larger share of the risk for addiction.

Even if a person manages to escape youth without developing an addiction, early and repeated exposure to addictive substances may influence their risk for a disorder later in life. "Some studies show differences in brain structures related to reward response and decision-making in individuals persistently exposed to substances at an early age," Agrawal says. She says brain scans of people with addiction disorders have also revealed that, compared with nonaddicts, their reward circuitry "just lights up" when presented with imagery associated with their problem substance or behavior. Much of this research is mixed, and it's not clear whether these patterns of brain activity are the cause or the result of a person's addictive behavior. But it's possible that heavy exposure to a substance at a young age may prime the brain for an addiction later in life, Agrawal says.

Further complicating all of this is something known as epigenetics, which blurs the line between genes and environment. Just because you have genes that code for a trait, that doesn't mean that trait will ever be expressed. The epigenome regulates whether the relevant genes get switched on or not—and experiences can play a role.

"Epigenetics describes how the genome can

adapt to cope with environmental factors," says Jian Feng, PhD, a molecular biologist at Florida State University. By "adapt," Feng means the way genes are transcribed or expressed after a person has been exposed to something like alcohol or opioids.

A 2018 study led by researchers at the Icahn School of Medicine at Mount Sinai in New York City found that exposing mice to cocaine changed the expression of genes associated with their brain's reward centers. And research on humans has turned up some of these same associations. "When we compare the DNA of opioid users to the DNA of healthy individuals, we see an increase in DNA methylation," says David Nielsen, PhD, an epigenetics researcher and an associate professor at Baylor College of Medicine. Methylation describes changes to DNA molecules that affect their expression.

There's also research on animals that suggests these epigenetic changes may even be able to be passed down to an individual's offspring. "If you give opioids to female rats," Nielsen says, "you can see changes two generations down." And so it's possible, though far from proven, that a parent's history with drugs or alcohol could affect their offspring's risk for an addiction.

THE FUTURE OF ADDICTION PREVENTION AND TREATMENT

DESPITE THE CHALLENGES EXPERTS FACE WHEN determining how all these variables interact to raise or lower a person's addiction risk, they say the latest genetic-testing technologies should soon help clarify things. "By taking huge groups of people—a million or more—and scanning their entire genome, we can look for genetic variance between people who have a problem and those who don't," Dick says. Identifying these patterns should one day allow doctors to estimate a person's risk for an addiction disorder before the first taste of a substance.

The question then becomes, what to do with this information? It's possible that, for some, pharmacological interventions may help lower addiction or relapse risks without unwanted side effects. There are already drugs available to treat alcohol-use disorders, and one of them (Antabuse) works by mimicking the action of those gene variants that cause some people to feel sick after imbibing. It has helped many people quit drinking. "For those who have had their brain rewired to be dependent on this extremely powerful reward, I think we have the potential to develop drugs to help these individuals get back to a more regulated place," Dick says. For others, risk-based education is the future of addiction prevention. "If an individual understands their specific liability, they can use this information to reach their potential and avoid pitfalls," she says.

In many ways, advances in genetic testing aren't needed to inform these sorts of interventions. "Parents say to me, 'Gosh, I wish I could know if my kid is at risk,' " Dick says. "And I say to them, 'You can!' " Even as a toddler, her son was an impulsive sensation-seeker. "He was the kid hanging from the tops of tall trees," she says. Based on the research linking these behavioral traits with an increased risk for substance-use problems, she knew her son needed a little more parental oversight and counseling on the risks of experimenting with drugs or alcohol. "You can teach kids skills and intervene in ways that can reduce their risk for problems," she says.

The future of addiction research will surely produce new insights that will shape more-effective treatments and prevention strategies. But today, what experts have learned about the genetics of addiction can help people avoid trouble and find relief. "Genetics are not destiny," Agrawal says. No one is born with DNA that preordains addiction. ◻

COMPULSION WITHOUT THE CHEMICALS

Getting hooked on gambling, sex, shopping or another behavioral vice is every bit as overwhelming as getting hooked on alcohol and drugs. The latest brain research explains why. By Barbara O'Dair

IN THE EARLY 1980S, MARRIAGE AND FAMILY therapist Chris Anderson took a break from his practice to try his hand at stock trading, joining a brokerage firm in his hometown of Austin, Texas. Within a couple of days, he doubled his money. Even though the sum was relatively small, he did the math and decided he liked what it told him.

"I went from not really knowing what I was doing to my mind filling with numbers so big that I couldn't even count them," he recalls. "I had been known as a tightwad in my family, ironically, but here I thought I'd discovered something amazing."

Hooked on the rush of getting rich quick, Anderson studied the markets, developed strategies, and began generating money for himself and his clients. Then he started losing—which did not discourage him, as it might have some people who got ahead of themselves in an unfamiliar field such as investing. Instead, he says, it only motivated him to take even greater financial risks. He became obsessed with making back the money he'd lost, and then some.

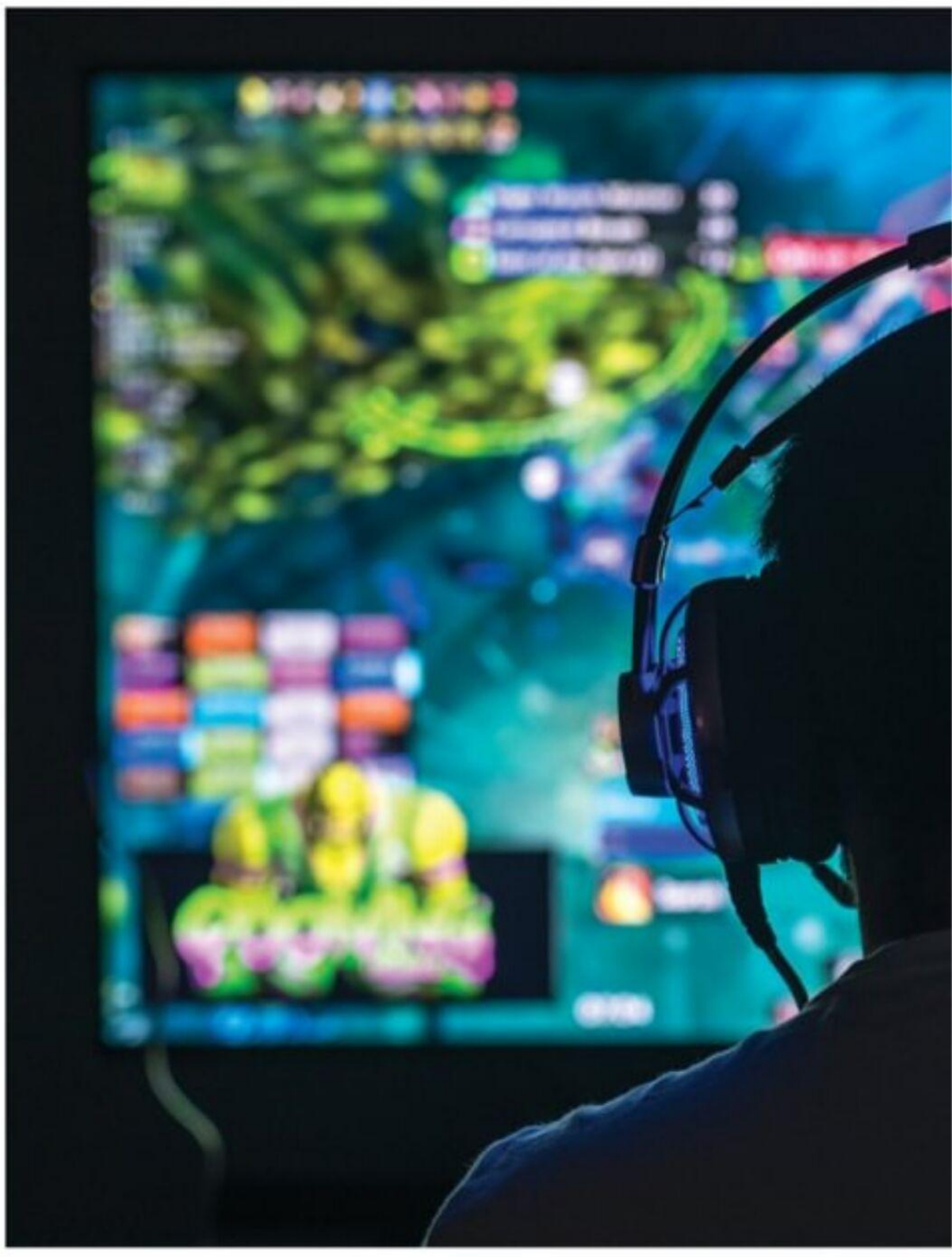
At the time, Anderson was married with two young children. "It took me only a couple of years to end up in bankruptcy court," he says. His house was foreclosed on, his wife divorced him, he did not see his children for 10 years, and he ended up suicidal, receiving treatment at Austin State Hospital.

Ultimately, Anderson found his way into a Gamblers Anonymous meeting, where someone steered him to a conference in Dallas that weekend. While there, he met the late Robert Custer, MD, a renowned psychiatrist who specialized in gambling disorder. Custer looked Anderson in the eyes and said, "You're really hurting, aren't you?"

"At that moment," Anderson says, "I moved from a place of despair to hope."

Since the day he began his treatment with Custer, Anderson says, he has been trying to understand his relationship with gambling—which is what speculative investment is for many people—and the disorder that cost him everything but his life. Now a compulsive-gambling counselor himself, he has worked with hundreds of people with gambling disorders to treat their addiction and unravel its mysteries so they can heal. These days, he says, he has two types of people in his life: "those who

About 2.5 million U.S. adults meet the criteria for gambling disorder each year, according to the National Council for Problem Gambling.



want to talk to me because they know that I get it, and those who want to avoid me like the plague because they know that I get it."

When it comes to an addictive behavior like gambling—or shopping or eating, or having sex or exercising, or playing video games—it's always been unclear whether anyone truly gets it. Indeed, it's long been debated whether these behaviors are an addiction at all. Drug or alcohol addictions require a chemical, an external agent that enters the body and messes with the workings of the brain itself. In some cases, the chemical is so powerful, the addiction seems almost instantaneous, as it is with heroin or crystal meth. In other cases, it takes a little while—nicotine, marijuana. Either way, the brain often gets hooked.

But behavioral addictions are just that: behavioral. No one smokes video games. No one shoots up shopping. Yet the result is the same—the cravings, the compulsions, the need for more and more in pursuit of a high that offers less and less. The first question is, How exactly does such repetitive behavior cause the brain to tip into an addictive cycle? The second, more pressing one is, How can an understanding of the mechanisms lead us to a cure?

WHAT'S IN A NAME?

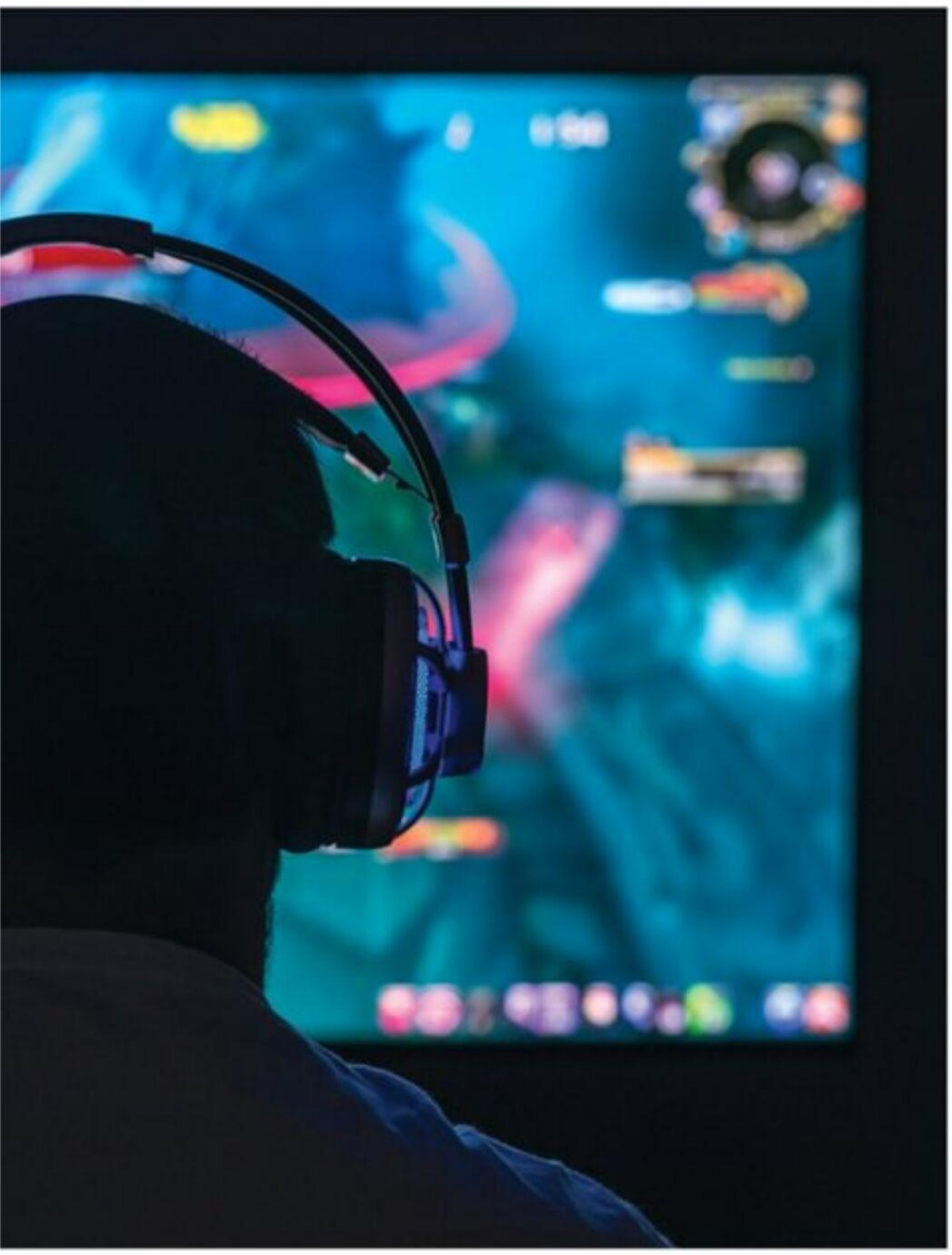
IN 1994, GAMBLING DISORDER WAS CLASSIFIED AS "pathological gambling" and was grouped with other impulse-control disorders such as kleptomania and pyromania in the benchmark psychiatric text *Diagnostic and Statistical Manual of Mental Disorders* (DSM). The authoritative reference for mental health professionals is conservative in its approach to classification, making changes only very slowly as scientific evidence mounts to challenge old ideas. It took 21 years—from 1952 to 1973—for the *DSM* to remove homosexuality from its list of mental disorders. So it was a really big deal in 2013 when the fifth edition, DSM-5, changed the diagnosis to compulsive gambling and classified it as a substance-related and addictive disorder alongside opioids, alcohol, and other substances.

Hypersexual disorder and gaming disorder were also considered for inclusion, and although neither was classified, gaming disorder was included in the manual's Section III, which lists diagnostic categories requiring further research that may someday be considered for classification. Then, in 2018, the World Health Organization released a revised *International Classification of Diseases* (the ICD-11), which included gaming disorder and compulsive sexual behavior disorder (CSBD), both classified as impulse-control disorders and not addictive disorders akin to substance abuse and, now, gambling. But that doesn't mean they're not the same problem. "Some things generate addiction at a higher rate—for example, nicotine or opioids; fentanyl will kill you rapidly," says psychiatrist and research scientist Nora Volkow, MD, director of the National Institute on Drug Abuse (NIDA), which is part of the U.S. National Institutes of Health. By comparison, she says, "[compulsive] shopping won't kill you, but it will disrupt your life. Likewise, video gamers have been known to stop sleeping and eating while in the grip of a game."

"ALL ADDICTS GIVE GREAT VALUE TO THE THING THEY'RE ADDICTED TO."

—Nora Volkow, MD

Over the course of her long career, Volkow has conducted research showing how heroin and other



opioids target the brain's rewards system by flooding the circuits with dopamine, a neurotransmitter that regulates emotion, motivation, and pleasure, among other things. When the system is activated at a normal level, it rewards natural behaviors. When drugs overstimulate the system, however, they can produce euphoric effects, strongly reinforcing the drug use.

Scientists have begun to understand that dopamine not only contributes to the experience of pleasure "but also plays a role in learning and memory—two key elements in the transition from liking something to becoming addicted to it," according to a *Harvard Health Letter* published in July 2011. This effectively teaches the drug user to repeat the behavior, and it's only a short step to the same circuits teaching us to repeat nonchemically mediated behaviors just as compulsively.

"This system has an important role in sustaining life because it links activities needed for human survival (such as eating and sex) with pleasure and reward," the *Health Letter* goes on to explain. "Addictive substances and behaviors stimulate the same circuit—and then overload it."

THE STORY OF A SEX ADDICT

ERICA GARZA, WHO GREW UP IN A MEXICAN-American family in Montebello, California, lived that pain. In the early 1990s, when she was a tween, she began thinking about sex—a lot. That's hardly unusual for people at that age, but the way she thought about it was. She remembers keeping lists of boys "I wanted to touch" and making crude sexual drawings. "At age 10 it seemed I lusted after everyone," she says, "my male and female teachers; the boys and girls in class."

Once Garza became sexually active, she says, "sex made me feel temporarily satiated. But it was almost always tied up in shame about the kind of sex I'd had, the kind of person he was, or the kind of fantasies I'd feasted on throughout. There was always something to feel bad about. I felt empty and anxious, waiting for the next round with someone new."

It got to the point that Garza became dependent on shame in order to feel pleasure, she says. Her 20s were marked by escalating, risky, unhealthy behavior, "being secretive, cheating, looking for men who would degrade me, having unprotected sex."

A low point came one night in Paris when she was recovering from the end of a significant relationship. "I drank too much and went home with a young waiter," she recalls. "I only remember fragments of the rough sex we had. After leaving his apartment in bloodied, ripped clothing, I wandered the streets until I found a taxi. I often think about how much worse that night could have gone—alone, drunk, and half-dressed." It's the first thing she thinks about when she reflects on those days.

Eventually, Garza says, she began listening to a voice in her head that kept "telling me to stop hurting myself and others." Thanks to a variety of interventions, including a short-term 12-step program and a therapeutic retreat, she began to shake herself free, and she now considers that dark time to be safely in her past. She's married, with a child, and living in Los Angeles, and she calls herself recovered. She published a memoir, *Getting Off*, in 2018.

Volkow has seen dramas like Garza's play out countless times, with the cycle of addiction and, sometimes, recovery more or less the same whether chemicals or behaviors are involved.

"All addicted persons give great value to the thing they're addicted to, so that it's constantly desired," she says. "Once a person addicted to food

eats, they have a need for more and more. Anything that has potential for activating the dopamine system has what we call an 'addictive dimension.'"

There's a lot more than mere semantics at play in labels like that. *DSM* classifications can have serious real-world ramifications. "How a disorder is classified has a significant implication as to who might receive care," says Marc Potenza, MD, PhD, a professor of psychiatry, child study, and neuroscience at the Yale School of Medicine and director of the Center of Excellence in Gambling Research at Yale. "If [a disorder] is seen in the realm of addiction, then people providing care in treatment settings should be receiving training in that area." Conversely, if a disorder is not classified as an addiction, it's much less likely that the providers will have the necessary experience to help the addicted person.

In addition, diagnostic criteria are used by clinicians when they write up their treatments for health insurers, which naturally has an impact on reimbursement. Then, too, there is the social component. If, say, food addiction or compulsive shopping were to become officially designated as a disorder, it's probably safe to say that those behaviors would become less marginalized and less likely to be dismissed as simply self-indulgent.

Potenza was part of the working group that recommended the reclassification of gambling disorder in the DSM-5, its arguments backed by studies revealing commonalities between gambling-disorder behavior and substance-use disorders. But not everyone agrees with the new addiction model.

Mary Jeanne Kreek, MD, who died in 2021, was perhaps best known in the field of neuropsychopharmacology and addictive disease for being part of a team of three scientists who developed methadone maintenance therapy for heroin addiction. As head of the Laboratory on the Biology of Addictive Diseases at Rockefeller University in New York City, Kreek brought a robust skepticism to what some experts see as a troublesome trend.

"I'll never call binge eating or sexual behaviors an addiction," she said in 2019. "Those are compulsive behaviors." She added, bluntly, that "behavior is behavior," distinct from "neurobiological changes in the brain from the drugs that my lab and others have been able to define in terms of addictive disease."

Researchers do have legitimate concerns about weakening the validity of diagnoses by being overly inclusive. Assign everyone the same label, and you prescribe everyone the same—or similar—treatment. Clearly the person who continually relapses on crystal meth requires a different recovery treatment than the gamer who never leaves the computer. Scientists have been studying behavioral disorders vis-à-vis substance addiction for several decades, and "we're still at an early stage of understanding the specific similarities and differences," concedes Potenza. "You can always benefit from more research."

WHO GETS HOOKED

JUST AS SOME PEOPLE CAN DRINK IN MODERATION while others dare not go anywhere near alcohol, because one drink inevitably means a great many drinks, so too can some people eat or shop or have sex or gamble and feel satisfied relatively quickly. So what is it that makes such basic parts of living so fraught for so many?

It would help if we knew just how many "so many" is, but without DSM classifications, an exact count of addictive behaviors is impossible. An estimated 6 percent of the U.S. population age 12 and over meet the criteria for a substance-use disorder. That's

more than 20 million people battling addictions to alcohol or an illicit substance. (This figure doesn't include nicotine.) Even without comparable numbers for addictive behaviors, if you add all of the individuals in 12-step programs, residential facilities, and therapy offices for nonsubstance addictive behaviors, plus the undiagnosed and the treatment-averse, the population of people battling addiction would likely swell to many millions more.

With the rise of interactive gambling and the legalization of sports wagering (more than three dozen states and Washington, D.C., have legalized sports betting or are in the process of legalizing it), there are new and readily accessible routes to gambling addiction all the time. Lia Nower, JD, PhD, director of the Center for Gambling Studies at Rutgers University's School of Social Work in New Brunswick, New Jersey, first became interested in gambling when she was a criminal attorney in Missouri. "In the criminal court system, there were people who never even had a parking ticket facing years in prison because of gambling-related crimes," she says. "There were no programs for them because no one thought gambling was a real addiction. And there are still no diversion programs."

SOME PEOPLE MAY BE HELPED BY COGNITIVE REFRAMING.

Both substance and behavioral addictions are multifactorial in origin, and one of those factors is surely genetic. Researchers estimate that genetics play anywhere from a 40 to 60 percent role in a person's vulnerability to addiction, even though no single gene has ever been found—or ever will be found—that will be pinpointed as the cause of addiction. That's just not how genetics works.

"In genome-wide studies of gambling disorder," says Potenza, "no specific gene or a region of the genome has reached genome-wide significance." Instead, addiction likely begins with a whole suite of factors involving both the genome and the lesser-known epigenome—the sort of keyboard that sits atop the genes and decides which will be played and which will remain silent. You might carry a gene that predisposes you to heart disease or depression, but if certain chemical, environmental, or experiential factors don't activate the epigenome, the underlying gene might do you no harm.

In the case of addiction, once those genetic chords start to play, they may influence all manner of behaviors. Similarities exist between substance and behavioral addictions just as similarities exist between specific substance-use disorders. That's why addicts may be cross-addicted, as the 12-step programs aptly put it, with alcohol, for example, helping to fuel binges of gambling or sex. It's why Alcoholics Anonymous meetings are so often choked by cigarette smoke. Las Vegas, where free booze in casinos and a legal gambling and sex trade coexist 24 hours a day, relies on this behavioral mash-up.

Simple temperament may be part of things, too. People who like risk may jump out of airplanes or ride roller coasters—and may similarly like the high-stakes thrill of getting rich or going broke on a single hand of poker. Risk-averse people find none of this appealing; that might mean a life of fewer thrills, but it may also mean fewer disasters.

Before his descent into addictive investing, Chris Anderson exhibited impaired impulse control, problems with social interactions, a tendency

to court danger, and a need for greater and greater risk stimulation—a constant upping of the ante—to achieve the same level of thrill. Those four traits alone check all of the DSM boxes for substance addiction. The manual lists nine characteristics for compulsive gambling—including repeated, failed attempts to cut back on gambling; frequent thoughts about gambling; often gambling when feeling distressed; and lying to conceal gambling activity. Anderson checked all nine.

"Domains like reward processing may show commonalities across addictions, as might impaired control or poor emotional regulation," says Potenza. "It's important, if we are going to advance prevention and treatment efforts, that we understand both similarities and differences."

TREATING THE DISEASE

GENERALLY, BEHAVIORAL ADDICTIONS POSE A significant challenge for treatment and recovery. That's partly because the behaviors that cause problems are, most of the time, not ones that lend themselves to abstinence. Plenty of people go their entire lives without drinking or smoking or doing drugs, and those who start can often stop. That's true too of behavioral addictions such as gambling and video gaming. But there's no such thing as swearing off eating or shopping or sex. They're fundamental parts of human life. That fact requires people with compulsive addictive behaviors to live in a state of gray—a little but not too much of the dangerous behavior. And addicts are very, very bad at gray.

One person struggling with compulsive sexual behavior disorder, for whom exhibitionism became part of the compulsive cycle, began driving around in his car looking for women to whom he could expose himself. At first he did it occasionally, then all the time. His need began to escalate, he says, in the same way that "an alcoholic might move from six beers to a dozen, and then to a dozen with a Jack Daniels on the side." For him, the spiral ended only when he exposed himself to a woman who turned out to be an off-duty police officer. She copied down his license plate number, and he spent eight months behind bars. After his release, he entered a recovery program that has been, so far, successful.

WHATEVER THEIR COMPULSION IS, IT LONG AGO STOPPED BEING FUN.

In some cases, the 12-step model or other forms of group therapy can be a part of the process, putting people with behavioral addictions in the company of other people fighting the same fight and calling on them to be accountable for their choices when they come back the next day or week.

Some antidepressants or other psychotropic medications may work too, at least by taking the edge off the anxiety or emptiness that comes from not indulging in the desired behavior. And while targeted medications are a key component of substance-use treatment, there is no FDA-approved pharmacological approach to gambling or other behavioral disorders. There is limited data on treatments with all classes of medication, including opioid analgesics. Experts like Volkow agree, however, that this area is wide open for further study.

"There's a lot of interest in medications," she says. "We see big patterns between food, sex, and drugs, and we need meds to block that."

People with addictive behaviors may also benefit from cognitive-behavioral reframing: challenging the internal narrative that a third doughnut, a fourth shirt in the same color, a fifth sexual partner will bring lasting peace and relief. That kind of approach can work for problem gambling, too.

Nower has learned that successful treatment for gambling addiction involves unraveling the magical thinking that's fueled by illogical thoughts about randomness. "If you roll a six-sided die and three comes up three times, and one doesn't ever come up, and you ask educated people, 'What do you think the next number is going to be?' some will say three because it's hot, and some will say one because it's due," she explains. That, however, is not how probabilities work, and challenged on the point, most people realize that fact. "The reality is they all know every roll is independent of that which comes before," Nower says. "But we're taught to look for patterns in our lives, and so we look for patterns in gambling. Those are things you have to address in treatment."

As with so many other psychological disorders, people with addictive behaviors who are working to get well also have to overcome shame and social scorn—the notion that they brought their problems on themselves and are to be blamed for not getting

them under control. In some ways, that's the result of science chiding itself. "Addicted persons get stigmatized because we can't help them," Volkow says. "We're advancing, but there are a lot of unknowns about the brain."

Across all addictions, people trying to break out of impulse and dependency can benefit from confronting a simple truth: Whatever their compulsion is, it long ago stopped being fun. The buzz of a drug, the ease of a drink, the thrill of roulette are no longer to be had—replaced by an urgency and a desperation, a need simply to get back to a baseline at which the pain of being addicted goes away. It's a rueful refrain among alcoholics that no one ever wants a second drink, much less a third or a fifth or a 10th. They all want that first drink all over again—the moment when the familiar expectation of peace settles in. They spend their drinking lives chasing that feeling, just like Anderson chased his initial investment losses, and just like someone who hops from bed to bed chases the thrill of when sex was new. "An addicted person's compulsion is like driving a car without brakes," Volkow has written.

No two addictions are identical, nor are any two treatments. Still, nearly all people in recovery share some of the same treatment protocols, including:

- Detox support to achieve initial stability.
- Diagnosis and evaluation to address co-occurring disorders.
- A treatment plan with a trained specialist, appropriate therapies, and goals for recovery.
- Ongoing peer support and accountability, such as a 12-step program with people in similar situations.
- Family support, including support groups for family members, education, and family therapy.

None of those approaches are easy, and none are certain to work. All take a lifetime commitment to remaining in control of urges that are straining to break free. All the same, asked what she would tell people struggling with addiction right now, Volkow remains optimistic: "You can recover. Don't give up. Treatment works." Then she adds ruefully, "But it doesn't cure it." □

THE HUNGER THAT CAN'T BE SATISFIED

Food addiction is a real addiction—and more and more people are getting hooked. By Jeffrey Kluger

NOBODY HAS TO SCORE HERSHEY'S KISSES ON THE street. Nobody has to smuggle Pringles across the country hidden in the wheel well of a car. And if you're paying $100 for a gram of Coke, you're definitely being overcharged.

But that doesn't mean that the life-sustaining substances we come into the world loving and couldn't survive without—the sugars and salts and fats and proteins, the fruits and vegetables and breads and meats, the snacks and the meals and the treats we eat at movies and the hot dogs we devour at ball games—can't get us into every bit as much trouble as the deadly, often illegal substances that cause so much suffering. You can eat compulsively, just as you can smoke or drink or do drugs compulsively. And in both cases, compulsions can become full-blown addictions, as repeated exposure plays the pleasure centers in the brain, creating a feedback loop of craving, indulging, consuming, regretting—and doing it all over the next day, and the next.

Some numbers suggest that food may be even more addictive than drugs. About 30 percent of people who try heroin become addicts; the same goes for about 16 percent of cocaine users. Those figures are beaten easily, however, by the more than 40 percent of Americans who are obese and the overall 71.6 percent who are overweight—which suggests at the very least an unhealthy dependency on food.

In some ways, food is more insidious than drugs, because, of course, there's no such thing as abstinence, no such thing as never starting in the first place, no such thing as being able to say, "Food? Never touch the stuff. I saw what it did to my uncle." You eat because you'll die if you don't, so you spend your life in a sort of nutritional two-step—a little but not too much; go overboard today, cut back tomorrow; eat the good stuff, but never the junk. Sometimes you succeed at all of that, and other times you fail terribly; we all do. The more we learn about how the brain and palate and metabolism process food, the more we're realizing that a lot of this is not our fault, and that food can indeed find its way onto the list of substances of abuse.

"In all my years as a physician, I have never, ever met a person who chose to be an addict, nor have I ever met someone who chose to be obese," said Nora Volkow, MD, the director of the National Institute on Drug Abuse, in her celebrated 2015 TedMed talk. "So imagine what it must be like to be unable to stop doing something when you want to." That inability is at the heart of addiction—and when it comes to food, we're all at risk.

Pleasure gets processed in many parts of the brain, but if you're looking for the spot where good feelings can turn into bad outcomes, you'll find it in the striatum. Buried deep in the midbrain, the striatum is rich in what are known as D2 receptors, whose job it is to bind with the feel-good neurotransmitter dopamine. It's dopamine that drives the reward system—the sensation of satisfaction you get from an obstacle overcome or a job well done. It's also dopamine that helps you experience more primal pleasures—food, sex, intoxication.

As long as the dopamine system remains in balance in the striatum, so too will our ability to control those pleasures—a single slice of cake; wine with dinner, but no more after that. When the system starts to flicker, however, with too few D2 receptors and too little dopamine being released to engage with them, our behavior is affected dramatically. Most notably, we give way to impulsivity, grabbing what we want when we want it, with little regard to the downstream consequences.

In a 2014 study published in *Neuropharmacology*, a pair of psychiatric researchers studied PET scans of the brains of both healthy subjects and heroin addicts and found that a falloff in striatal function could indeed be detected in the subjects hooked on the drug. The researchers cited additional studies showing similar brain deficits in people addicted to other substances and behaviors. Significantly, in the case of those addictions, the pleasure is processed in a variety of brain regions, but the inability to resist the temptation is consistently linked to the striatum.

When it comes to food addiction, dopamine is not the only chemical in play. Also implicated is the hormone leptin, which is released by fat cells and is responsible for feelings of satiety. When you're hungry and dive into a meal, your leptin levels are low. When you've eaten your fill, it's leptin that tells you to push away from the table. Ideally, that's something to which you don't give much thought; you just know you feel satisfied, and you stop eating. For people who eat compulsively, either leptin is not released in sufficient quantities or it is but the brain doesn't react to it adequately.

"In animal models, we know that leptin modifies the rewarding effects of alcohol and possibly cocaine," says Volkow. "In obesity, there is leptin tolerance." In this case, tolerance is not a good thing—it means the brain shrugs off the hormone.

The particular foods that make up our menu can play a role in addictive eating, too. Nutritionists often lament America's ostensible sugar addiction as a leading cause of the obesity epidemic, but it's more complex than that. We may find candy and doughnuts and other sweet foods irresistible, eating them even when we know we shouldn't. "But that wouldn't happen if you walked into an office and there was a bowl of white sugar on a table," says Rachele Pojednic, PhD, a nutrition and exercise science expert and lecturer at Stanford University. Instead, the sweets we eat compulsively are products of a trifecta of irresistibles—sugar and fat and salt. Individually, they're entirely unappetizing. Together, they make magic, turbocharging the so-called hedonic eating system, the business of eating just for pleasure.

SWEETS ARE A TRIFECTA OF IRRESISTIBLES: SUGAR AND FAT AND SALT.

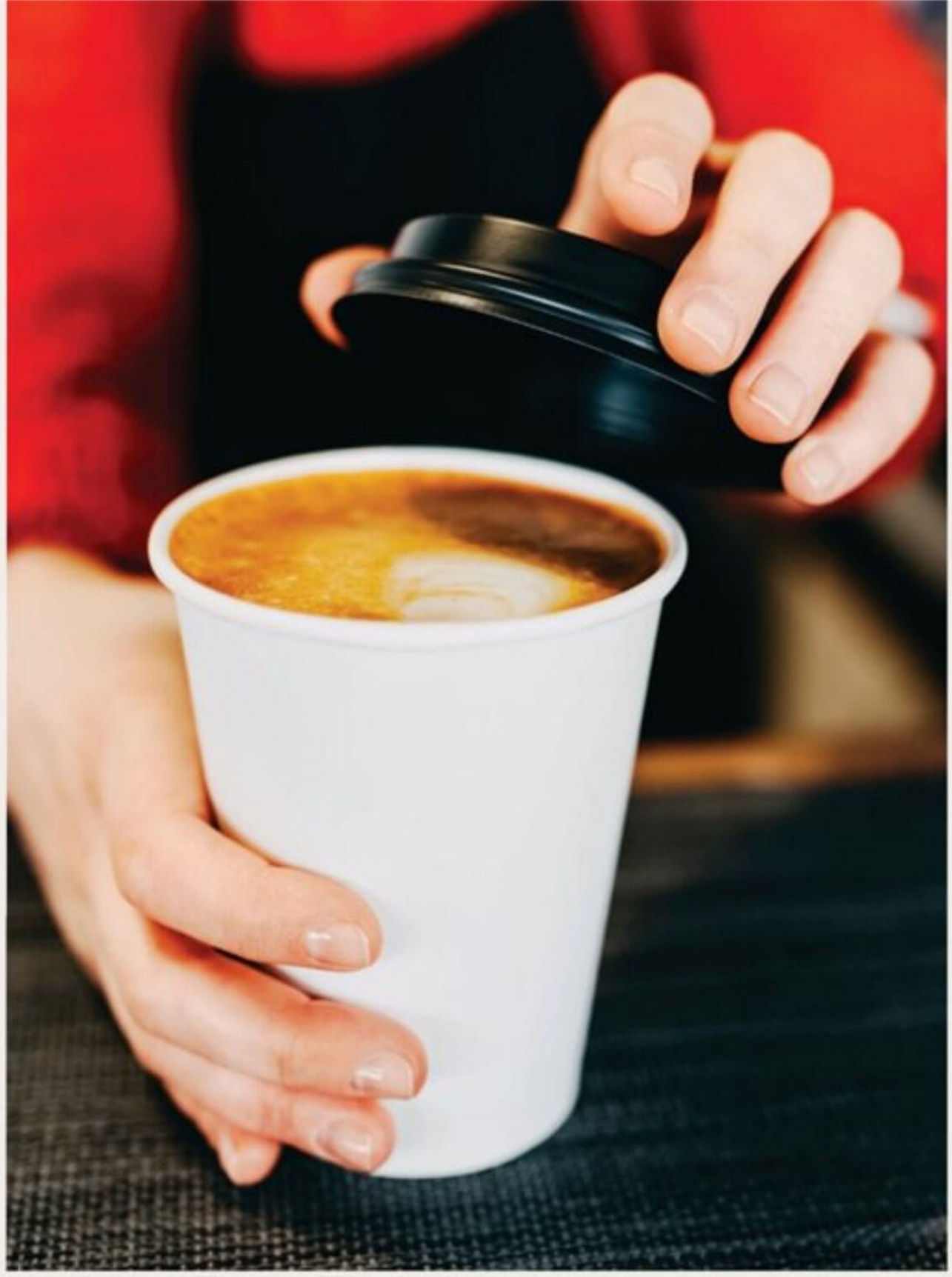
It's not only in humans that this happens. In a 2013 study led by neuroscientist Joseph Schroeder, PhD, at Connecticut College, researchers found that Oreos—an indulgent staple of the human diet if ever there was one—light up the neurons in the pleasure center of rats' brains even more powerfully than cocaine does. And, like humans, the rats knew where to find the sweetest, fattiest, tastiest part of the cookie. "They would break it open and eat the middle first," says Jamie Honohun, a student who assisted in the research. In a statement accompanying the release of the study, Schroeder and his team wrote, "These findings suggest that high fat/high sugar foods and drugs of abuse trigger brain addictive processes to the same degree."

What happens to the same degree can lead to the same (or at least similar) consequences—in this case dependency, and too often misery. There's profound joy to be found in food, and unlike the destructive pleasure that's found in drugs, it's a joy that can be experienced in moderation. Very much like the destructive pleasure of drugs, however, it's something that can easily spin out of control. Compulsive eaters—sometimes dismissed as lacking willpower or discipline—can experience every bit the battle that drug addicts do. And they deserve support as they struggle to recover. ◻

—Additional reporting by Jamie Ducharme, Mandy Oaklander, and Maia Szalavitz

Coffee Talk: Just How Addictive Is Caffeine, Anyway?

By Jamie Ducharme



An estimated 66 percent of Americans drink coffee every day, according to data from the National Coffee Association. In many ways, it's a healthy habit: Research shows coffee may boost longevity and decrease the risk of type 2 diabetes, heart disease, and more.

But when the habit crosses the line from a pleasant pick-me-up to a daily necessity, the equation gets a little more complicated.

People can develop a dependence on coffee and other caffeinated beverages, such as tea, soda, and energy drinks, says Merideth Addicott, PhD, an associate professor of neuroscience at Wake Forest University School of Medicine. Addicott, who has researched caffeine, explains that caffeine is not truly addictive in the way that drugs and alcohol are. But she confirms that "people certainly do develop tolerance and dependence and go through withdrawal when they stop using it."

Here's what you need to know about caffeine dependence—and how to break the habit.

How can you tell if you're dependent on caffeine?

Addicott says caffeine dependence is more about the way the substance affects your day-to-day functioning than it is about the actual amount you consume. There's no specific number of cups, or milligrams of caffeine, per day that signifies a problem. Instead, Addicott explains, it's more about how distressed people feel if they can't get caffeine when they want it, and how much of a disruption it causes in their daily lives. "It's more of a subjective threshold," she says.

That said, most experts recommend that adults consume no more than 400 milligrams of caffeine per day (approximately the amount in four 8-ounce cups of coffee, depending on the bean). If you regularly drink more than that, you may be at risk of side effects including sleep disruption, migraines and other headaches, quickened heartbeat, muscle tremors, irritability, nervousness, and an upset stomach, according to the Mayo Clinic. For some people, those side effects can kick in with even fewer cups, as caffeine tolerance is highly individualized.

If you experience physical side effects, have trouble dialing back your consumption, or feel totally out of sorts when you can't get your daily fix, those are signs that you may be dependent on caffeine and should consider cutting back, Addicott says.

How can you beat caffeine dependence?

The hardest but most important step may be convincing yourself that you don't need caffeine in the first place. Many people feel that it's necessary for success at work or school, but caffeine doesn't make a dramatic impact on the brain or cognitive performance, Addicott says. In fact, caffeine dependence is closely intertwined with its perceived—not actual—effects.

"When you drink a certain amount of caffeine every single day, your body adapts to that and maintains the normal baseline performance," Addicott says. "When you don't get that much caffeine, you go through withdrawal, which can actually lower your performance. So then it feels like caffeine is having this strong effect and improving the ability to concentrate, but it's really not. It's just bringing you back to that baseline."

THE NEW SCOURGE OF VAPING

E-cigarettes were supposed to be a safe way to wean smokers off tobacco—and they may help. But they're also a powerful way to get teens hooked.

By Jamie Ducharme

JAMI SCHEETZ KNEW THAT HER TEENAGE SON, Devon, needed help. His grades were slipping, and he had been caught vaping at school so often that he was on the brink of being expelled. In the fall of 2018, at the start of his freshman year of high school, Devon's school even sent him to the hospital for drug testing after yet another vaping incident. In the emergency room, he finally admitted it: He was addicted. "He said to me, 'Mom, I can't quit on my own. I need help,'" Scheetz says.

Vaping, which has never been legal for children younger than 18, has become huge among kids over the past few years. Even federal legislation enacted in December 2020, which made it illegal to sell any tobacco products including e-cigarettes to people under 21, hasn't stopped the problem. The sleekly designed devices—which heat a liquid that contains nicotine, flavoring, and other chemicals into an inhalable vapor—have eclipsed cigarettes in popularity among teenagers. Though use of e-cigarette products has come down in recent years, the U.S. Food & Drug Administration reported in 2024 that 5.9 percent of middle and high school students were still vaping.

There remains ongoing concern that e-cigarettes will hook a whole new generation on nicotine. In 2018, the U.S. Surgeon General even called vaping

The number of high schoolers who say they vape regularly is four times the number who smoke cigarettes.

an "epidemic," and the FDA has continued to impose restrictions on manufacturers, including suspending the manufacture and sale of sweet, candy-like flavors for "closed pod" e-cigarettes like Juul in February 2020. Yet loopholes in the policy exempted other devices, so that when youths could no longer get Juuls, they switched to disposable devices like Puff Bars, which still offered sweet and fruity flavors.

As more kids get hooked, parents like Scheetz are learning that resources to help users quit are scarce. E-cigarette use has far outpaced science when it comes to finding treatments for nicotine dependence. "It's frustrating. It's an epidemic because there's no help," Scheetz says. "The only way to fight the epidemic is to help and treat them, because it is an addiction."

That's not the way vaping was initially advertised. Manufacturers have promoted their products as tools for weaning cigarette smokers off combustible tobacco and toward a safer alternative that does not include the dense mix of carcinogens and other toxins found in tobacco smoke. Vapes are not FDA-approved for that use, and there is no conclusive evidence that they're effective for adults trying to quit.

Even if e-cigarettes succeed at lowering the risk of lung cancer and other diseases in tobacco smokers, they may create problems of their own. Research suggests that vaping may increase the risk of heart disease and respiratory problems and cause DNA changes in cells in the mouth that may lead to cancer.

The biggest risk, however, is that e-cigs are ferociously addictive. The most popular brand among kids is Juul, which is designed to look more like a flash drive than a cigarette—perhaps no accident, since that makes it easy to conceal in school. (Juul has long maintained that its products are not meant for youth users and says it is working to curb teen use.) A single Juul pod, or reservoir of vaping liquid, allows for about 200 puffs, packing the same nicotine punch as an entire pack of cigarettes.

It's not easy to find treatment for kids who get addicted even to traditional cigarettes, since nicotine dependence is primarily seen as an adult problem. Finding treatment for vaping addiction is even harder, because nobody really knows how to treat people of any age who get hooked on e-cigs. "There are no treatment guidelines yet for these products," says Donna Richardson, clinical coordinator of the Rutgers Tobacco Dependence Program.

Without specific treatment standards for young patients, clinicians often resort to standard nicotine-replacement therapies such as patches and gum, even though they're designed for adults and evidence of their success against vaping dependence is mostly anecdotal. "We have nothing else," Richardson says.

Worse, most teens who get hooked on e-cigs aren't using them to quit cigarettes, which would at least have some arguable health benefits. In fact, researchers are concerned about vaping's so-called gateway effects. Literature from Johns Hopkins suggests that 2 million young adults use electronic cigarettes as their first nicotine product and that young people who vape are more likely to go on to use illicit drugs and tobacco products such as cigarettes.

In some cases, young vapers don't even know what's in their device. One study found that only 37 percent of 15- to 24-year-olds who vaped knew that Juul e-cigs always contain nicotine. One mother, who asked that her name and location not be disclosed to protect her family's privacy, told TIME that when her son started vaping as a fresh-

E-cigarettes are discreet, which makes them popular among kids as young as middle school.

man in high school, he thought e-cigarettes produced "water vapor" and did not contain nicotine. Two years later, when his grades had fallen and he'd gone from athletic and sociable to sullen and withdrawn, she realized he needed treatment for nicotine dependence.

But everywhere she turned, she got no help. "I hit a wall," she says. A therapist trained in youth addiction referred her to a treatment center, but the center didn't take adolescents. Her son's pediatrician didn't know what to do either. The only place she found support was the group Parents Against Vaping E-Cigarettes, which advocates for strict regulations on e-cigarettes and offers a community for parents whose kids have gotten hooked.

Even with the group's help, recovery options seemed limited to inpatient treatment centers, some of which were located across the country. She and her husband told her son he had two choices: quit, or pack up and go to rehab. Playing hardball worked. After a few days of physical withdrawal and headaches, she says, her son kicked the habit. But she wishes he had had more resources.

"It was like this tsunami. I see my child going under, and you're kind of paralyzed," she says. "You just don't know what to do."

Jami Scheetz, Devon's mother, also hit a wall when seeking treatment for her son. When he told her he needed help, she turned first to his emergency-room doctors. They couldn't treat minors and suggested that Scheetz ask her son's pediatrician—who said he wasn't equipped to treat vaping addiction. Through a local smoking-cessation program, Scheetz at last found Frank Leone, MD, who runs Penn Medicine's Comprehensive Smoking Treatment Program. But his office, too, said he couldn't treat minors.

"At this point, I'm frustrated, because it's been like two months, and everywhere I turn, I'm being turned down," Scheetz remembers. "I just said, 'Can you please just have the doctor call me? Maybe he could direct me somewhere else.'"

When the staff passed along her message, Leone finally gave her the answer she wanted. He said he would see Devon for an assessment, despite the insurance issues that could come from billing adult services for a minor. But Leone waved that aside. "It's much more important to me that I help this kid with this major life problem than whether or not I get paid $100 from his insurance company," he says. But "the burden of the system is so onerous that I can imagine a lot of folks are just like, 'I don't have time, I'm not going to deal with it.'"

In the end, treatment for Devon was covered. But besides the insurance issues, some doctors are also nervous about treating patients who fall outside their specialty, whether they're addiction specialists not used to seeing kids or pediatricians who don't usually deal with substance misuse. "As a medical community, we haven't spent a lot of time or sufficient resources developing really universally available tobacco-dependence treatments for adolescents," Leone says. Options are even slimmer for e-cigs.

That's a problem, because demand is only growing. One group that has worked to fill the void of treatment options for youth is Truth Initiative. In January 2019, the anti-tobacco group launched a text-based e-cigarette-cessation app, This Is Quitting, targeted to young people. By March of that

Many teens who vape are unaware that e-cigarettes contain nicotine.

year, about 31,000 people had registered. As of 2024, the program has helped more than 750,000 people, according to the group.

Some parents have checked their kids into inpatient rehab centers, according to news reports. But the vast majority of families are simply looking for insurance-covered outpatient care, and "it just sort of doesn't exist" in any consistent way, says Jonathan Avery, MD, an addiction psychiatrist at New York–Presbyterian/Weill Cornell Medical Center.

Avery says he almost never treated kids struggling with nicotine addiction until the vaping phenomenon began. "We thought we were winning the game on cigarettes," he says. "Suddenly, after probably seeing one adolescent for nicotine use in the last five years, there's all sorts of [young] people looking for treatment, wondering what to do."

Until those treatments become available, patients, parents, and doctors are working with what they have. Avery started a counseling-based treatment program for adolescents with vaping dependence, and he encouraged his hospital system's adolescent psychiatrists and pediatricians to refer patients who were struggling. Over two months, he got more than 50 calls from colleagues and treated about 30 adolescent patients, he says. Most just needed counseling, but Avery tried guided tapering plans or nicotine-replacement products for those who needed more. At this point, vaping treatment is still largely experimental.

Leone recommended nicotine patches to Devon, which helped quell his cravings, according to his mother. But if he starts vaping again, "we have to come up with some other things," Scheetz says.

The FDA continues to clamp down on underage vaping, including requiring proof-of-age safeguards to prevent sales to anyone under 21. In August 2020, the agency also issued warnings to manufacturers that had been exempt from the February policy, telling them to stop marketing and selling candy-like flavoring designed to attract young buyers.

All of that may help. But if the long history of human addiction has shown anything, it's that when users want a substance, they'll find a way to get it. And when those users are kids, their brains and behaviors could be shaped for life. ◻

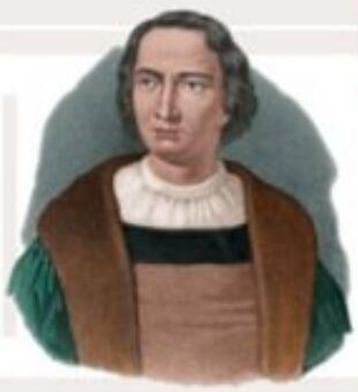
The Long History of Addiction

4000 BC

Evidence of first winemaking facility, in Armenia

3400 BC

Earliest known cultivation of opium, in ancient Mesopotamia



1492

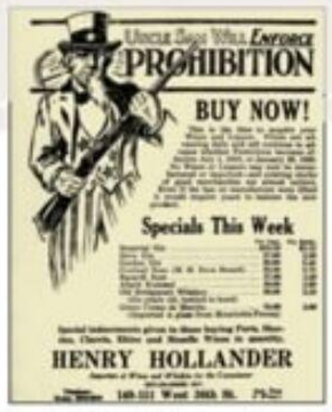
Native Americans in the Bahamas offer Christopher Columbus dried tobacco leaves

1600

Marijuana cultivation begins in the U.S. with Jamestown settlers, who use its strong fibers to make ropes and clothing

1919

Volstead Act passed to stop alcohol production and sale in the U.S. (voided 1933)

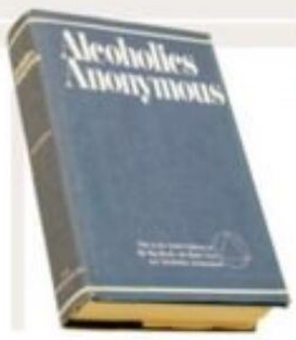


1830

Industrialization needs an efficient workforce; the U.K.'s temperance movement is born

1925

Lucky Strike cigarette brand launches diet campaign advising "reach for a Lucky instead of a sweet"



1935

A stockbroker and a surgeon (both alcoholics) create Alcoholics Anonymous

1971

President Richard Nixon declares a "war on drugs"

1985

Crack cocaine makes headlines in New York and L.A.

1982

10.5 million Americans report using cocaine

1994

Tobacco industry denies that nicotine is addictive

2012

Colorado and Washington vote on legalizing recreational marijuana

2017

U.S. declares "public health emergency" as opioid overdoses average 130 per day

2018

U.S. Surgeon General declares vaping an epidemic

ADDICTION BY DOCTOR'S PRESCRIPTION

Well-intentioned pain policies plus powerful opioid meds led to the current epidemic of addiction and death. But there's new hope.

By Jeffrey Kluger

IT'S NOT EASY TO FIND A MOTHER WHO LOOKS back fondly on the time her son had cancer. But Penny does. Penny (not her real name) lives in Boston, and her son got sick when he was just 13. He struggled with the disease for several years—through the battery of tests and the horror of the diagnosis and, worst of all, through the pain that came from the treatment. For that last one, at least, there was help—OxyContin, a time-released opioid that works for up to 12 hours. It did the job, and more.

The brain loves OxyContin, the way the drug lights up the limbic system, with cascading effects through the ventral striatum, midbrain, amygdala, orbitofrontal cortex, and prefrontal cortex, leaving pure pleasure in its wake. What the brain loves, it learns to crave. That's especially so when the alternative is the pain of cancer therapy. By the time Penny's son was 17, his cancer was licked—but his taste for Oxy wasn't. When his doctor quit prescribing it to him, he found the next available thing: heroin. Penny soon began spending her Monday nights at meetings of the Boston-based support group Learn to Cope, which counsels families of addicts, particularly those hooked on opioids or heroin.

"Penny told the group that she actually misses her son's cancer," says Joanne Peterson, the founder of Learn to Cope. "When he had that, everyone was around. When he had that, he had support."

Penny and her son are not unique. Humans have never lacked for ways to get wasted. The natural world is full of intoxicating leaves and fruits and fungi, and for centuries, science has added to the pharmacopoeia. In recent decades, that's been especially true. As the medical community became more attentive to acute and chronic pain, a bounty of new drugs rolled off Big Pharma's production line.

There was fentanyl, a synthetic opioid around since the 1960s that went into wide use as a treatment for cancer pain in the 1990s. That was followed by oxycodone, a short-acting drug for more routine pain, and after that, OxyContin, a 12-hour formulation of the same powerful pill. Finally came hydrocodone, sold under numerous brand names, including Vicodin. Essentially the same opioid mixed with acetaminophen, hydrocodone seemed like health food compared with its chemical cousins, and it was regulated accordingly. The government originally considered hydrocodone a Schedule III drug—one with a "moderate or low" risk of dependency, as opposed to Schedule IIs, which carry a "severe" risk. Physicians must submit a written prescription for Schedule II drugs; for

Schedule IIIs, they just phone the pharmacy. (Schedule I substances are drugs such as heroin that are never prescribed.) For patients, that wealth of choices spelled danger.

"If someone is dying, addiction isn't a problem," says James Rathmell, MD, anesthesiology chair at Brigham and Women's Hospital in Boston. "But for prescribers, the distinction between a patient who has three or four weeks to live and one who's 32 and has chronic back pain started to blur."

The result has hardly been a surprise. By 2016, 1 in every 65 deaths in the U.S. was due to an opioid overdose, including 1 in 5 among young adults. In 2024, nearly 55,000 people in the U.S. died of a drug overdose involving an opioid—an average of 150 people a day. Up to 29 percent of people who are prescribed opioids for chronic pain wind up misusing the drugs. And there are a lot of people getting that first taste. In 2023, more than 125 million opioid prescriptions were written in the U.S., or 37.5 prescriptions for every 100 people. That was actually the lowest rate in 17 years and was a major decline from the 2012 peak of 255 million opioid prescriptions, or 81.3 prescriptions for every 100 people. The improvement was at least partly a result of the fact that it was in 2014 that the government bumped opioids from Schedule III up to Schedule II.

"I STARTED COMPLAINING OF MORE PAIN THAN I HAD SO I COULD GET MORE OXY. FINALLY, I STARTED BUYING IT ON THE STREET."

—"Jason," an inpatient at the Hanley Center in Florida

But 125 million prescriptions is still 125 million prescriptions, even if not all areas of the country are feeling the effects equally. The South and portions of the Midwest—where economic woes are likely to be more common—are hit harder than most of California and portions of the Northeast and northern plains. One 2018 study in the *Annals of Emergency Medicine* found that when patients visited emergency rooms in Arkansas with minor but painful injuries such as a sprained ankle, 40 percent left with an opioid prescription. In North Dakota, the number was under 3 percent.

No one suggests that Arkansas doctors are less concerned with their patients' welfare than North Dakota doctors are. All manner of factors—from how well the hospital is staffed and equipped to what kind of insurance a patient has—can determine who gets the quick fix of a feel-good pill. And there are darker factors at play too.

Part of the cause of the national opioid epidemic is greed, and even fraud—at least according to federal prosecutors who, in April 2019, indicted Laurence Doud III, the retired CEO of Rochester Drug Cooperative, a company that continued supplying pills to pharmacies that had already been cut off by other prescribers for exceeding purchase and distribution limits. In one case, the company kept the drug spigot open to a pharmacy that had gone from buying 70,000 units of oxycodone to 200,000 over the course of just a year. The pills were a revenue stream for both the pharmacy and Rochester—one that neither one was willing to give up.

Nearly 3,000 states, counties, municipalities, and Native American governments sued Purdue Pharma and several members of the Sackler family, who controlled the company, for cashing in on the opioid crisis with reckless and misleading marketing and then seeking to make more money on the back end by also selling drugs to treat the addictions that resulted. "The Sackler family built a multibillion-dollar drug empire on addiction," said New Jersey attorney general Gurbir Grewal while filing a 200-page lawsuit. In January 2025, after years of litigation, the Sacklers and Purdue Pharma agreed to pay up to $7.4 billion to settle numerous lawsuits.

But it's not just that kind of venality that caused the problem. And it's not just the stubborn human tendency to find a chemical high hard to resist, at least for just a what-harm-could-it-do taste, only to find that it can do a lot of harm indeed, and now it's impossible to stop. It's also a case of very good intentions gone very badly awry, in a way that now seems inevitable but that no one foresaw.

UNINTENDED CONSEQUENCES

AMERICA'S OPIATE JAG BEGAN, LIKE SO MANY things, with a whole lot of hope. In the 1990s, the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO)—the accrediting body for hospitals and other large care facilities—developed new policies to treat pain more proactively, approaching it not just as an unfortunate

side effect of illness but as a fifth vital sign, along with temperature, heart rate, respiratory rate, and blood pressure. As such, it would have to be routinely assessed and treated as needed. "It was a compassionate change," says Catherine Barber, a senior researcher at the Injury Control Research Center at the Harvard School of Public Health. "Patient-advocacy groups pushed hard for it." And, she points out, drug companies did too, since more-aggressive treatment of pain would mean more-aggressive prescribing.

But the timing was problematic. The JCAHO policy went into effect in 2000, about the time the new opioids were hitting the market and shortly after the Federal Trade Commission began allowing direct-to-consumer drug advertising. When market, mission, and product converge this way, there's little question what will happen. And before long, patients not only were being offered easy access to drugs but were actually having the medications pushed on them. No routine tooth extraction was complete without a 30-day prescription for Vicodin. No ambulatory surgery ended without a trip to the hospital pharmacy to pick up some Oxy. Worse, people with chronic pain were getting prescriptions that could be renewed again and again.

"People with pain complaints get a 30-day prescription for OxyContin, and it's like a little opioid starter kit," says Barber.

"For me, it started with lower-back pain," said Jason (not his real name), a carpenter in his late 50s, who entered a 90-day inpatient protocol at the Hanley Center, a residential addiction facility in West Palm Beach, Florida. "I went to my doctor, and he prescribed OxyContin. After a little while, I was finishing a one-month prescription in three weeks, then in two. I started complaining of more pain than I had so I could get more Oxy, and finally I started buying it on the street. In a pharmacy, I paid $8 for 160 pills. On the street, I was paying $25 each."

Jason's demographic profile is typical at Hanley—older, whiter, and generally wealthier than addicts of previous generations. And while some people do wind up buying on the street, many never needed to, thanks to the gray market that sprouted up around opioid sales. As long as the drugs are legal and real doctors are prescribing them, it's a simple matter to hang out a shingle and call yourself a pain clinic. Pay-to-play patients are given prescriptions based on little more than their word that they're in pain—sometimes backed up by self-evidently altered MRIs.

There has been a crackdown on these so-called pill mills, especially in Florida, where they once thrived. But what started in places like West Palm Beach spread to economically distressed areas in the Rust Belt and Appalachia, where hiring has lagged behind the rest of the country, never quite recovering from the 2008 economic crash. Unemployment and idleness have long been associated with drug addiction—and drug addiction, in turn, makes people less employable, leading to what researchers call "deaths of despair" as lives simply cave in on themselves.

"When we look at what's going on in . . . West Virginia, Ohio, Pennsylvania, those are the states that have the highest rates of drug overdoses in the country," said David Radley, PhD, a senior researcher with the Commonwealth Fund, when the group released a study on opioid deaths in economically struggling areas in June 2019. "The rate of drug-overdose deaths in West Virginia is absolutely mind-boggling," he added in an interview with NBC News.

Prescription overdoses were claiming famous lives even before the recent epidemic.

Marilyn Monroe

Elvis Presley

Dorothy Dandridge

Michael Jackson

Anna Nicole Smith

Heath Ledger

KILLING THE BUZZ

IT WILL BE A LONG TIME BEFORE WEST VIRGINIA and the rest of the country kick the opioid habit, and a lot of lives are likely to be lost to the epidemic before it's all over. But things are improving, and Congress—uncharacteristically, in this era of partisan paralysis—deserves much of the credit.

In October 2018, both congressional chambers passed the Support for Patients and Communities

Act, by votes of 393 to 8 in the House and 93 to 1 in the Senate. The law provides for a host of steps, including developing a national workforce to deal with substance-abuse disorders, requiring that state children's health-insurance programs include treatment for substance abuse, and that Medicare screen beneficiaries for signs of addiction. Addiction treatment is also to be made more broadly accessible in hospitals and clinics, and private partners, including Blue Cross Blue Shield and CVS Health, are committing to implementing such remedial steps as improving drug-disposal protocols and opioid education.

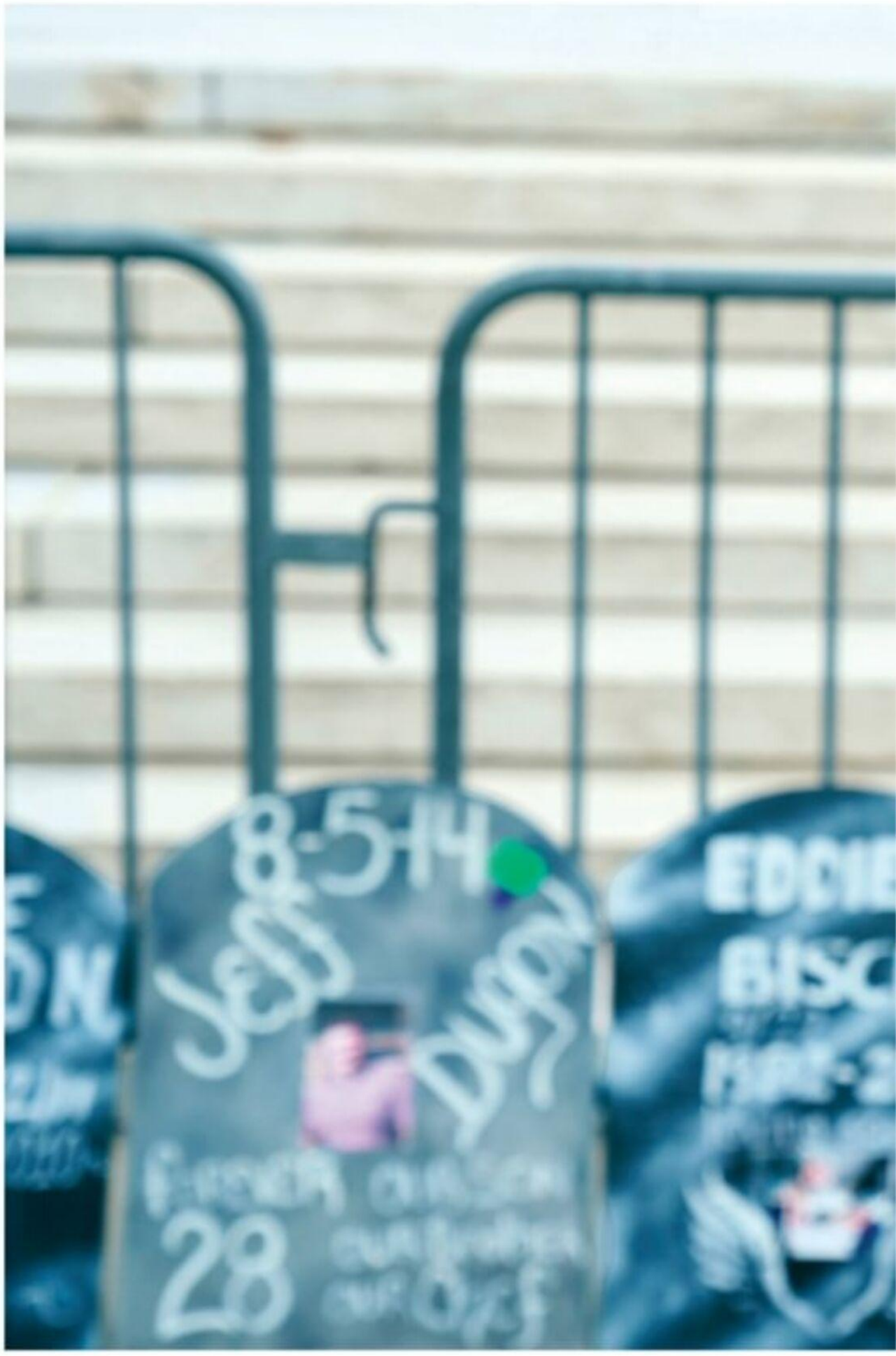
But some lawmakers see the new law as just a down payment on what is certain to be a need for more action—and more money.

"Unless we significantly expand funding and resources for treatment, this national crisis will continue to worsen," said the late Rep. Elijah Cummings of Maryland, who co-sponsored the law with Sen. Elizabeth Warren of Massachusetts.

There were signs that the nation as a whole was turning things around even before the bill was signed. A study published in March 2019 in the *New England Journal of Medicine* found that there were already fewer opioids crossing pharmacy counters into consumers' hands simply because doctor awareness had led many of them to write fewer prescriptions.

In the study, researchers led by Wenjia Zhu, PhD, a fellow in the department of health-care policy at Harvard Medical School, and Nicole Maestas, PhD, an associate professor there, found that new prescriptions for opioids dropped dramatically from 2012 to 2017. Analyzing insurance claims from Blue Cross Blue Shield from more than 86 million people, the researchers calculated the monthly incidence of new opioid prescriptions and found that during the study period, the total fell by 54 percent. The number of doctors prescribing opioids for the first time to patients or to people who had not had them prescribed in the previous six months also declined, from 114,043 to 80,462.

That was exceedingly welcome news, but Maestas and her team did find that physicians who continued to prescribe opioids were more likely to prescribe them for longer periods and at higher doses than the Centers for Disease Control and Prevention guidelines currently recommend for first-time users. "On the one hand, we are very much encouraged," Maestas says. "The study does suggest that every month, fewer people are being started on



opioids, which means the risk of developing opioid addiction is lower. Our enthusiasm is a bit tempered, however. One group of providers didn't seem to get the message."

That's indeed a cause for worry—and not only because so many tens of thousands of people are starting down the opioid road. An equally pressing problem is how to help all of the millions who preceded them there and are now battling full-blown addiction.

More action by Congress and state legislatures can help by improving electronic pharmacy records, making it easier to track and prosecute doctors who are overprescribing and patients who are drugstore-shopping, getting pills in multiple locations at once. An overall task force could also be designated by Congress to coordinate the billions of dollars in federal funds that are rolling out in response to the crisis.

Families of those who died from opioids gathered at the Supreme Court in 2023 to protest against Purdue Pharma, makers of OxyContin.

Such an effort could prevent multiple agencies such as Health and Human Services and the Centers for Disease Control from duplicating efforts, as well as maximize funds in the states where they are most needed."You need Congress choosing an agency and saying, 'This is your baby,'" says Barber.

Insurers—the bad guys in so many policy debates—can do a lot of good by keeping better track of the number and types of controlled substances their policyholders are receiving. Big Pharma, in addition to being held accountable in the thousands of lawsuits brought by state, county, and municipal governments, must help as well. That means getting off the opioid gravy train and working harder to develop more nonaddictive painkillers, even if it means fewer sales and lower profits.

The greatest burden of all, of course, is borne by opioid addicts themselves. Those who have not already lost their lives to prescriptions or the heroin and fentanyl that take their place when the money runs out have a lifetime of work to do to get sober and stay that way. "When drug addicts or alcoholics ask us if they can ever use substances in moderation, we tell them no," says Barbara Krantz, an addiction expert and Hanley's former CEO. "Once your brain becomes a pickle, it can't go back to being a cucumber." Too many Americans are pickled already. The time to help them is now. ◻

—Additional reporting by Alice Park

CHAPTER 2

The Resp

Addicts and their loved ones often feel
they have limited options. But traditional
treatments have evolved into multifaceted
therapies, and many families are finding hope.

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BEYOND THE 12 STEPS

The Alcoholics Anonymous model has worked for drinkers and drug addicts for decades. But there are other options as well. By Lisa Lombardi

WILLIAM NELSON, A NATUROPATHIC MEDICAL doctor in Scottsdale, Arizona, never intended to get involved in addiction medicine. But then his stepdaughter, Lauryn, became hopelessly dependent on heroin. She overdosed multiple times ("Her heart stopped twice—they had to use the paddles on her"). As the twentysomething cycled in and out of rehab and the ER, Nelson lived in fear of the inevitable tragedy. But one day, he stumbled upon a drug called naltrexone, an old FDA-approved medication that treats opioid addiction by blocking opiate receptors in the brain. After Lauryn received naltrexone implants, which slowly infuse the drug into the system, "she was able to remain sober for the first time," says Nelson.

Lauryn's story could have had a far different ending. Every day, 150 people in the U.S. die from opioids, including heroin and prescription painkillers such as OxyContin, fentanyl, and Vicodin. Unintentional overdose deaths from these drugs have shot up almost 500 percent since 1999. The odds are not good for a quick recovery from addiction: 85 to 90 percent of people who kick opioids start using again (officially known as the recidivism rate) within one year. Relapse is now considered to be part of recovery, which can take many years. Heavy drinking, meanwhile, affects a staggering 16 million Americans, according to the 2023 National Survey on Drug Use and Health, and can be extremely difficult to overcome. Studies show it's not a quick fix. Only one third of those who get help for a drinking problem are free of alcohol one year later.

But there is some encouraging news on the recovery front. Old medications are being given a second

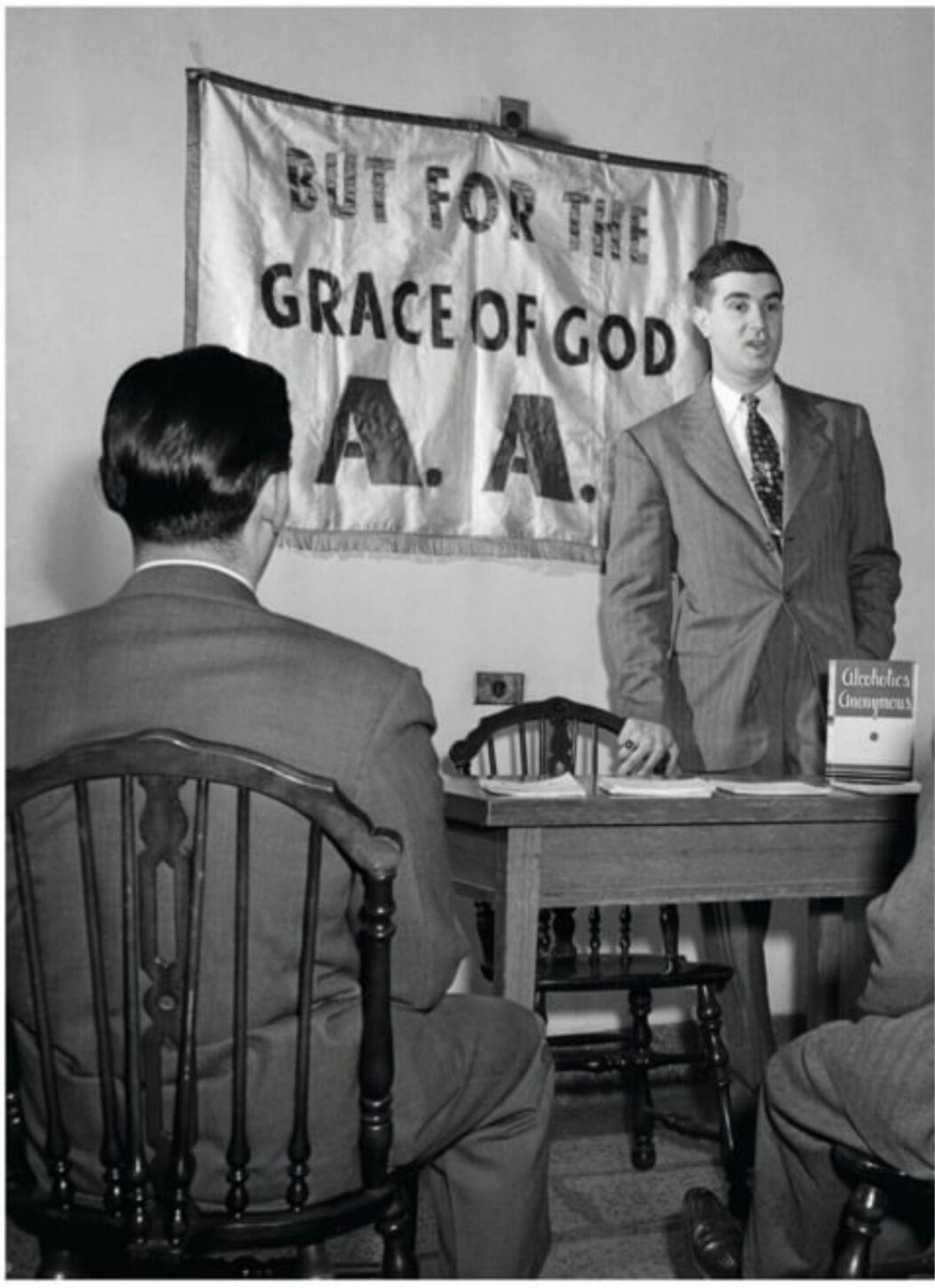
look and used in new ways to curb cravings for drugs and alcohol. Programs are springing up that emphasize holistic approaches to recovery, including cognitive behavior therapy—retraining the brain to build healthier neural pathways. The biggest change of all, though, is a rethinking of what recovery even means. Does it mean sober? Or could it mean . . . sober-ish?

"There's a paradigm shift going on in our field," says Vonnie Nealon, clinical director of Warriors Heart, an inpatient substance-abuse treatment program for military veterans and first responders in San Antonio, Texas. "We're realizing that there may be some people with a substance-abuse problem who are able to recover. However, they may still need to take medications like benzodiazepines—or others—for their anxiety, depression, or other co-occurring disorders." Some of the people treated at Warriors Heart, for instance, may plan to return home and continue using a different chemical, such as alcohol, in moderation. This is not recommended, though, as it eventually leads back to their substance of choice.

Of course, this goes against everything we've ever heard about addiction and recovery. For 90 years, Alcoholics Anonymous has ruled the recovery landscape, preaching a gospel of total abstinence: You're on the wagon or you're off. More than 2 million members worldwide maintain sobriety by taking active part in AA's 12-step program, with its emphasis on surrender to a higher power and acceptance that you are powerless in the face of your demons.

In recent years, the program has come under fire. Critics argued that the scientific evidence to back up the 12-step approach was inconclusive, despite its ongoing popularity. In 2020, however, an influential Cochrane review declared that AA was, in fact, supported by research, for 42 percent of the population. Nealon, who used AA herself to get sober decades ago, says she knows the program works—just as clearly as she knows that it doesn't work for everyone. "Recovery is not one-size-fits-all with everyone fitting comfortably into a 12-step program," she notes.

Part of the problem with abstinence is that it leaves out problem drinkers who are unwilling or unable to give up booze entirely. Presented with a binary choice (keep drinking heavily or never have another drink), they choose the former. That may be why only 10 percent of problem drinkers never seek help. Given that heavy alcohol use puts people at increased risk for disease and early death, the goal is to help more of the other 90 percent get control of their drinking even if they can't fully quit.



DRUGS FOR DRUG PROBLEMS?

MEDICATIONS ARE A POTENT TOOL IN THE FIGHT against addiction, but they aren't used often enough, with fewer than half of treatment programs offering drugs for opioid addiction, according to a study in the *Journal of Addiction Medicine*. Naltrexone—the drug that Lauryn used to break free of the grip of heroin—is a well-established medication that won FDA approval in the 1980s to treat opioid addiction. In the early 1990s, it was also approved for alcohol-use disorder.

So how does it work? Naltrexone is an opioid antagonist: It blocks opiate receptors in the brain. That means it's impossible to get high while naltrexone is in your system. The drug also curbs cravings for opioids, which may be the real key to why it's making a difference

Circa 1950, an AA attendee spoke at a local meeting after three months without a drink.

in the fight against addiction. "It takes away the uncontrollable cravings that make sobriety so difficult and relapse so common," says Nelson.

The first step to starting naltrexone treatment is to detox from the opioids, because if there are still drugs in the system, addicts will experience a rapid, much more extreme and potentially dangerous form of withdrawal. Once the body is opioid-free, there are a few ways to take naltrexone. The first is via an FDA-approved injection. In 2015, the pharma company Alkarmes won approval for Vivitrol, a long-acting injection of the drug. Vivitrol stays in the system for 28 days at a time, so it involves monthly trips to a doctor. According to the company's research, people who get Vivitrol are one seventeenth as likely to relapse as those given a placebo.

MORE THAN 2 MILLION MEMBERS FOLLOW AA'S 12-STEP PROGRAM.

Another option is the naltrexone pellet. Made in a compounding pharmacy and implanted in the backside, generally by an alternative practitioner, the pellet keeps the opiate-blocking drug in the system for three to six months. Nelson says naltrexone has been nothing short of miraculous for his patients. "If done correctly, it's virtually impossible to relapse," he says. He recommends patients get pellets implanted (and replaced) for the first 18 months to two years of recovery and then switch to the oral form of naltrexone, which they'll take for the rest of their lives.

RX FOR BOOZE

YOU CAN ALSO TAKE NALTREXONE PILLS AND THE Vivitrol shot to help you give up alcohol. But it actually seems to work better when the person continues to drink. This approach is known as the Sinclair method, named for the Stanford physician who discovered it in the 1970s. Sinclair found that taking naltrexone one hour before drinking chemically disrupts the body's reward system, taking away the desire for alcohol. "It causes an extinction of the reward system," Nelson explains. The addict slowly cuts back on drinking as the reward of drinking is slowly unlearned. Remember Pavlov's dog, who stopped salivating after the food was no longer provided when the bell was rung? That phenomenon, known as extinction, is what's at work here. A study published in the *Journal of Clinical Psychopharmacology* on the Sinclair method found that a group that was given naltrexone before drinking drank significantly less than a placebo group.

Nelson himself was a skeptic before he started using this method on his patients. "I thought it had to be a hoax," he says. But he has since seen it help hundreds of people. In his clinical experience, it works 90 to 95 percent of the time. "One patient went from drinking 30 or 40 beers a day to being able to come home from a hard day at work and have a single beer," he says. Another went from being a hard-core alcoholic to having just the occasional glass of champagne at a wedding. It can take anywhere from a short time to a year and a half for problem drinkers to reduce their drinking to that of a social drinker. The downside is that you need to take the pill before drinking for the rest of your life (or for as long as you choose to drink).

There are other meds that can help in the battle with the bottle. Common prescriptions such as the nerve-pain drug gabapentin, the anti-smoking drug Chantix, and the seizure drug topiramate are being used off-label to dull cravings and help drinkers cut back. Another FDA-approved drug, Antabuse (disulfiram), is an aversion therapy that chemically turns drinkers off of alcohol. Drinking while taking Antabuse yields miserable feelings (vomiting, chills, crashing headaches). The upside is, it works. The downside is, it works so well—making people so miserable—that it's hard to stay on it.

Holistic approaches to recovery, such as tai chi, can complement other treatment modes.

COGNITIVE THERAPY

EVEN IF A PERSON GOES THE medication route, therapy is also critical. Cognitive behavioral therapy (CBT) focuses on changing both behavior and thought processes, reframing the need to drink and the central role alcohol plays in a drinker's life. Many programs employ it to help people start new behaviors that change their brain and set them up for future success. SMARTrecovery is an AA alternative program that emphasizes CBT. "It's not like a 12-step where they ask you to rely on a higher power," explains Nealon. "They still do meetings, but they leave the God part out."

Also key: getting help for any coexisting mental health issues. At Warriors Heart, patients are assigned two counselors: one to help treat their addiction, and the other to help them work through mental-health challenges such as PTSD and depression. "The truth is, a lot of people who use drugs and alcohol do so because it has become a coping mechanism. And somewhere in their journey, they found if they drank, they could forget their problems for a while," says Nealon. Or they found that if they drank before a meeting at work, their coworkers wouldn't realize they had PTSD. "The longer you use that coping mechanism, the more it's going to affect your brain chemistry, and the more you're going to have to depend on it," she adds. If people don't get help for those issues while at rehab, she adds, "when they leave the program, the co-occurring disorder is going to raise its head. You can't control depression with willpower."

EVEN IF A PERSON GOES THE MEDICATION ROUTE, GETTING THERAPY IS ALSO CRITICAL.

In addition, many treatment programs incorporate mindfulness and wellness. From Yoga of 12-Step Recovery classes and tai chi to emotional-support animals and hypnotherapy, these holistic approaches give addicts tools to help cope when they're back in the real (often stressful) world.

Not everyone will respond to chimes and meditation, however. The best way to help someone recover from addiction, experts say, is to find the best approach for that person.

And that means never giving up. Nelson wants the world to know about the medication that is helping so many of his patients and that saved his stepdaughter while there was still time. Lauren, now nearing 30, works at one of the rehab programs she attended. Nelson says, "She's treating her former self." ☐

How to Get the Cures to the Patients

By Barbara Sadick

Naltrexone, methadone, and buprenorphine are all common drugs used to treat opioid addiction.

Although there are numerous medications to treat drug and alcohol addiction, better access and more research are still needed. The urgency of the current U.S. opioid crisis is causing more of often-scarce federal dollars to be spent investigating drug addiction than alcoholism. At the same time, says Joshua D. Lee, MD, a professor of population health at NYU School of Medicine, we are not using enough of the drugs and other resources we already have.

Generally, two mainstay drugs have been used in addition to naltrexone to treat opioid disorder. Methadone, which has been prescribed for decades to treat heroin and other addictions, is delivered only in specialized addiction clinics operating under strict regulations that may require patients to show up for treatment five or six days a week. In some parts of the country, such clinics are not easily accessible.

Buprenorphine, itself a kind of opioid, is another option. It can be prescribed and administered by physicians in their offices, but only by those who have undergone special training and have received a waiver from the FDA allowing them to prescribe; most doctors have not. Naltrexone, not a controlled substance like the other two, has no special requirements for administering, but the formulation approved for treatment of opioid-use disorder necessitates an injection once a month for as long as a patient is benefiting.

Partly as a result of all these requirements, says Jennifer McNeely, MD, an addiction medicine physician at NYU Langone, only 20 percent of those with opioid-use disorder receive any treatment, and fewer than 10 percent are being treated with medication.

Perception matters, too. The fact that alcohol is legal, widely used, and culturally accepted contributes to the low numbers of alcoholics seeking treatment. There's not the same social stigma associated with drinking as there is for drugs such as heroin and cocaine. By its very nature, says James Garbutt, MD, a researcher at Bowles Center for Alcohol Studies at the University of North Carolina, addiction is an obstacle to seeking help. Substance abusers want to keep using; if the culture tells alcoholics their substance isn't so bad, that can be all the permission they need. The same phenomenon can have a subtle impact on pharmaceutical companies, which may feel less demand to develop drugs to treat alcoholism than to treat opioid abuse.

Experts agree that several policy changes need to be made to help curb the national addiction crisis. Special prescribing requirements, for example, should be eased, and clinics should be more widely accessible. "We do have incredibly good medications; they just aren't getting to enough people," says McNeely.

Finding more medications to treat opioid and alcohol abuse requires tolerance for trial and error. To be effective, says Garbutt, treatment for alcohol addiction requires working with patients on an ongoing basis and being open to treatment changes along the way. "What we need," he says, "is for doctors and patients to educate themselves about addiction, including paying attention to the problems of access."

TREATMENTS AT THE FRINGES

Two promising techniques may be able to help manage addictions by targeting key regions in the brain itself. By Laura Entis

ADDICTION IS AN INTRACTABLE DISEASE, DRIVEN by a complex network of biological, psychological, and environmental contributors. It's widespread—nearly half of Americans report having a close friend or family member who has been addicted to a substance—and it's deadly. In 2024, drug overdoses in the U.S. claimed more than 80,000 lives, exceeding the national toll from car crashes, AIDS, or guns.

The scale of the addiction problem is huge. And yet there remain few effective solutions beyond 12-step programs, support groups, and medications to treat opioid-, tobacco-, and alcohol-use disorders. (There are no FDA-approved treatments for cocaine-, stimulant-, or hallucinogen-use disorders.)

Medications can work well, "but it depends on the person," says Anna Lembke, MD, medical director of addiction medicine at Stanford University. "We don't consider it strange that people who have cancer might respond to one chemotherapy rather than another . . . but for some reason, when it comes to addiction, people get all up in arms, as if there should be one magic wand that would solve the problem for everybody." Alternative therapies could provide better options to patients who are ill-suited for current treatments—and options are what addicts need.

Enter neurostimulation procedures, in which areas of the brain receive targeted energy through either an implanted electrical device or pulses of magnetism applied to the skull or forehead. On its surface, treating as stubborn a problem as addiction with energetic intervention sounds improbable. But preliminary research has been encouraging, to the point that researchers are beginning to conduct clinical trials. "It's all coalescing," says Allen Ho, MD, a neurosurgeon with Kaiser Permanente in Orange County, California.

FOR DECADES, DOCTORS have applied electronic charges to the brain to treat a range of diseases, most notably movement disorders. Among the wide variety of techniques, the two most heavily researched have been deep brain stimulation (DBS), a surgical procedure in which an electrode is threaded into the brain and connected to a small device similar to a pacemaker, and transcranial magnetic stimulation (TMS), in which electronic magnetic coils are applied to the surface of the skull.

Each has its benefits. TMS is noninvasive, while DBS reaches areas in the brain that surface currents can't. Together they are approved for conditions including Parkinson's, essential tremor, dystonia, obsessive-compulsive disorder (OCD), epilepsy, and

Deep brain stimulation has been used to treat Parkinson's, depression, OCD, and addiction using an implanted pulse generator.

depression. In general, side effects are rare and mild.

We owe much of our understanding of how neurostimulation works—and how it could work in cases of addiction—to movement disorders. In the past, Parkinson's patients often received lesion therapy, in which a spot in the brain was burned away to regulate tremors and other motion and alleviate rigidity. Starting in the 1970s, with the advent of neurostimulator technology and its resulting experiments, it became evident that targeted electrode pulses were capable of providing the same relief in a reversible and less risky way. In 2002, DBS was approved to treat Parkinson's, followed by essential tremor and dystonia. Approval next came for other conditions that stem from regulation issues, such as depression, OCD, and attention deficit hyperactivity disorder.

Addiction has also long been a target. Whereas a healthy brain is able to control and override urges to satisfy cravings and pursue pleasurable activities—to know, in essence, when enough is enough—in an addicted brain, that "circuit is hijacked," Ho says. "Addiction is a disease process through which people have a deranged ability to self-regulate."

In movement disorders, hyper-specific targets in the brain have been well established over time. Not so for addiction, although general regions associated with the brain's reward circuitry, including the nucleus accumbens, prefrontal cortex, and insula, have been established.

"The brain essentially activates these areas to help reinforce future behavior," says Benjamin Walter, MD, medical director of the Cleveland Clinic's Center for Neurological Restoration's Deep Brain Stimulation Program. Such reinforcement is an important function that aids in habit formation. It's believed that OCD and addiction are caused, at least in part, by the dysregulation of these circuits.

Brain stimulation works by disrupting malfunctioning circuits and replacing the dysfunctional activity with a steady current. The idea is that by overriding aberrant wiring with a constant bland signal, the brain is able to "readapt and achieve a more normal state," Walter says. For Parkinson's patients, this means the regulation of movement. For those with substance-use disorders, the hope is that the artificial stimulation will alleviate the "abnormal need" that characterizes addiction.

What has helped surgeons identify which parts of the brain to target with the curative current have been both animal studies and functional magnetic resonance imaging (fMRI) of human subjects, in which addicted and nonaddicted brains are watched in real time and compared to locate correlates of the disease. In mice, scientists have not only identified brain structures that cause addictive behavior but are also able to reverse them through targeted stimulation, essentially turning addiction on and off. But such a clean, direct causal link has not been established in more-complex human brains. That's because even if fMRI has identified where the addicted human brain differs from the nonaddicted brain, it still doesn't reveal what is causing these changes to occur. It's possible that aberrant activity in certain regions is actually compensating for addiction rather than causing it, in which case well-intentioned stimulation therapy could worsen the condition, says Michael Fox, MD, PhD, a professor of neurology at Harvard Medical School and director of the Center for Brain Circuit Therapeutics at Brigham and Women's Hospital.

Researchers have some idea of neuromodula-

Transcranial magnetic stimulation is a noninvasive therapy using magnetic pulses.

tion's ability to treat addiction in humans by targeting regions associated with the reward circuitry and watching the result, but most of the data has come from open trials. Unlike in double-blind studies, subjects and investigators can bias the results when they know which group is receiving real treatment.

For movement disorders, a causal relationship has been established between circuits and symptoms. Fox has seen wheelchair-bound patients with terrible tremors stand up, walk across the room, and write on a chalkboard after their device is activated. "It's dramatic," he says.

Yet even in movement disorders, researchers aren't sure how neuromodulation enables the brain to regain control of runaway circuits and help patients, in turn, regain control of their bodies. "Are we shutting [the circuits] down? Are we slowing them down? Are we reversing them?" Ho asks. "These are questions that no one has a very good answer for."

IT'S POSSIBLE THAT ABERRANT ACTIVITY IN CERTAIN BRAIN REGIONS IS COMPENSATING FOR ADDICTION RATHER THAN CAUSING IT.

FOR ALL THE question marks, it's not hard to see why investigators are excited about brain stimulation's potential in treating substance-use disorders. Even if the results don't come from double-blind trials, there's plenty of evidence that neuromodulation can treat addictive behavior, at least in certain patient populations. A 2015 paper published in *Addiction* examined cigarette smokers who, as a result of stroke, suffered brain damage. Some patients experienced an unexpected side effect of the ordeal: reduced tobacco-withdrawal symptoms and cravings, an effect that was statistically more likely to occur when the damage was to the insula. Brain stimulation could provide the same therapeutic effect by targeting the same area, Fox says.

In two new clinical trials, Nolan Williams, MD, associate professor of psychiatry and behavioral Sciences and director of the Brain Stimulation Lab at Stanford Medical Center, will explore TMS's ability to treat alcohol dependence and opiate cravings in adults with substance-use disorders. (The nucleus accumbens is believed to be implicated in both mood disorders and substance abuse.)

Although the evidence that comes from studies like these may be compelling, establishing a true causal relationship between brain stimulation and reward circuitry regulation requires large double-blind trials. Conducting them, however, presents real challenges. DBS and TMS trials involve modulating circuits in order to change desire and behavior. Whether addicts are able to fully consent remains an open ethical question, Ho says. And then there are the logistics. Double-blind neuromodulation trials, in which patients and investigators are kept in the dark about who is receiving treatment rather than a placebo, can be tricky to pull off, particularly for DBS, a surgical procedure.

What's more, even if DBS and TMS prove effective, addiction is a multifaceted disease that isn't exclusively caused by changes in the brain. Unless underlying societal, social, and environmental factors are also addressed, it's likely that many patients will continue to engage in addictive behaviors even following treatment.

Neuromodulation remains a promising potential tool to treat addiction that needs to be refined and vetted over time. After all, scientists may more or less know the parts of the brain involved in addictive behaviors, but they are still working to pinpoint the exact circuits at work in those regions. "I think it's a matter of good large studies looking at the data carefully and, probably most important, identifying the right patients to offer the therapy to in these clinical trials," Walter says.

For now, it's essentially an educated game of trial and error. Success depends on whether researchers select the correct targets right away. If they don't—a real possibility—the first batch of clinical trials will fail. That doesn't necessarily mean the treatments don't work, only that "we didn't use the right therapy at the right target," says Fox. From there, researchers must start again—armed, crucially, with more data for more trials.

For addicts facing a viselike disease with limited options, new solutions can't come fast enough. "Treating addiction is never going to be one-size-fits-all," Lembke says. "To build an effective infrastructure to treat patients who have serious addiction problems, we need to make sure they have access to all the available tools." □

From left: Andrew, Kim, Sean, and Michelle Humphrey.

THE FAMILY DILEMMA

Parents can become ATMs for addicted kids, giving them money that just goes for drugs. Is it better to take a hard line and cut them off?

By Kristen Bahler

KIM HUMPHREY WAS SITTING IN A SEA OF chairs, surrounded by about 40 people he had never met, when he finally realized what a train wreck his life was.

Humphrey, a Phoenix police officer, didn't want to talk about it. Especially to a bunch of strangers. But his wife, Michelle, had researched addiction support groups online, found one at a recovery center across town, and dragged him here all the same. And now, as Kim stewed silently in his seat, mentally rehashing the made-for-TV drama he found himself in, he had a sudden moment of clarity.

Kim isn't an addict, but as with everyone else in the room, drug and alcohol abuse had sunk its barbs into his kids. And that was robbing him of his health, his sanity, and nearly every penny he had.

For close to a decade, he and Michelle had shuffled their two sons in and out of rehab centers and hospitals. They paid for cars, medical bills, and legal fees. They handed their sons cash for food, gas, and clothes, and when they realized it all went for drugs, they tried giving them gift cards instead. (It turns out, thanks to a grocery store's gift card–redemption machine, those could be turned into drug money too.)

In some ways, the couple had been lucky. Both of their sons were alive, and as a public employee, Kim had health insurance that had saved them thousands in medical costs. Still, all told,

Originally reported in 2018.

the Humphreys had spent more than $50,000 in a futile attempt to save their children from addiction, Kim estimates.

The emotional costs were even more staggering. By the time Kim made it to that first support group, the stress of wondering where his kids were, what they were doing, and whether it would end up killing them was so overwhelming, he'd taken a leave of absence from work. He was too depressed to make it into the office, he says. Some mornings, he was too depressed to get out of bed.

"I felt like, as a guy, a cop, a dad, that I should be able to solve this," Kim says. "We begged, we cajoled, we tried everything we could to get them help. And everything backfired."

Money struggles are a common theme in addiction stories. Drug abuse eschews practical considerations; rent money and retirement savings don't often top an addict's list of priorities. As a result, many parents, like the Humphreys, foot the bill for every debt their child neglects—on top of every recovery strategy they can throw their paychecks at.

Kim met some of these people at his first meeting, and when he came back the next week and the week after that, he met still more. He got to know their stories intimately: parents who spent hundreds of thousands of dollars, emptied out their 401(k)s, and declared bankruptcy on account of a child's addiction. A mother who had lost her home; a father who had replaced his daughter's car eight different times. A couple who couldn't bear to kick their son out of the house, but, because he'd stolen so much of their money and disrupted so much of their lives, had resorted to letting him stay in their garage and feeding him meals through a doggy door.

The meetings were hosted by Parents of Addicted Loved Ones (PAL), a growing network of faith-based support groups sprouting up across the country. Kim says the organization saved his family. For years, he and Michelle had wrestled with a question that plagues every family of an adult addict: Should we cut our kid off?

Now they had an answer.

FOR ALL THE bleak public-health reports, for all the PSAs, for all the fist-pounding, change-promising, crowd-pleasing stump speeches, the magnitude of America's addiction problem is still remarkably hard to comprehend. At last count, more than 2 million Americans were addicted to heroin or prescription opioids, the umbrella term for painkillers like morphine, codeine, and oxycodone. More than 80,000 people died from a drug overdose in 2024. Numbers like those have prompted the U.S. Department of Health and Human Services to declare a public health emergency. Owing in part to the spike in overdose deaths, for the first time in decades, American life expectancy is declining.

But the struggles of families, if their stories are told at all, are often an afterthought in the relentless cycle of overdose, withdrawal, and relapse that is every addiction narrative. The burden alcohol and drug abuse places on millions of parents—and the choke hold it has on their finances—is itself a crisis.

Watching a son or daughter succumb to drug abuse is a special kind of torment. Some parents feel deeply responsible for the addiction eating away at their child's personality, health, and future, even if its impetus was out of their control, which it typically was. It's a grief so deep, there's even a medical term for it: chronic sorrow, the feeling of a "living

Sean (left) and Andrew Humphrey are now both in recovery.

loss" more commonly associated with parents of children with chronic health conditions. Naturally, they want to do everything in their power to stop it.

Often, parents slip into a caretaker role: making their adult son's or daughter's meals, chaperoning them, and paying for everything from rent to rehab. Some clinicians call these relationships "codependent," though many in the addiction field reject the term, saying it puts undue blame on loved ones.

What experts do agree on is that getting clean is largely independent of how much money you spend or what kind of rehab you spend it on. If someone isn't ready to commit to sobriety, bankrolling their lifestyle or bailing them out of every bad situation and debt isn't going to persuade them otherwise.

"[Parents] are faced with this dilemma: Do I help them get out of this in the short term, or do I let them experience the natural consequences of their behaviors?" says Kenneth Leonard, PhD, director of the University of Buffalo's Clinical and Research Institute on Addictions. "You don't want to do anything that will ruin their lives, but on the other hand, you want them to learn from experience. Nobody wants their child to suffer, short term or long term."

When Diane Buxton's son developed an opioid addiction in high school, she was resolute. "I was going to save him," Diane says.

At 14, he'd been prescribed painkillers for a football injury and had gotten hooked. He switched to heroin by the time he was 18. As his friends went off to college and started families, he morphed into a walking drug-abuse public-service ad—when he wasn't out getting high, he lay slumped on her couch, half-watching TV. Diane, who lives in a middle-class neighborhood in Indiana, says she spent more than $70,000 on eight rounds of rehab, outpatient counselors, and miscellaneous expenses that ranged from putting gas in her son's car to paying for his lawyer. In eight years, nothing had worked.

"I remember walking through my living room one day and seeing my 130-pound son, who was supposed to be 160 pounds, sitting on the couch with needle marks in his arm," she says. "And I heard this voice saying, 'You're loving him to death.'"

Shortly after, Diane gave her son a choice: stay at a local mission center, check yourself into a free faith-based rehab, or move in with a friend. Living at home was no longer an option.

He did move out and bounced around from couch to couch before eventually checking himself into rehab. Today, Diane says, he's been in long-term recovery for seven years and owns a subcontracting business in New Hampshire.

"If I had not given him those choices, he'd be dead or in prison," she says he tells her.

Redemption stories like this aren't the norm. The truth is, we know very little about our addicted population and even less about how best to treat their disease. People respond differently to recovery methods, especially when their addiction started as a means to treat pain or when it is part of a mental-health issue. According to a 2019 survey from the Substance Abuse and Mental Health Services Administration (SAMHSA), 9.5 million adults in the U.S. experience a co-occurring disorder of both mental health problems (depression, PTSD,

anxiety, and more) and substance abuse.

What's more, new data suggests that interventions can do more harm than good, and that the absolutist, abstinence-only approach to recovery that groups like Alcoholics Anonymous have long touted doesn't work for everyone. Multiple studies have found that medications like methadone and buprenorphine are the most reliable means of rehabilitation, though not the only ones. But since those drugs are opioids themselves, officials haven't exactly warmed to using them as a wide-scale treatment method.

In the meantime, drug addiction is an economic burden we're all shouldering, to the tune of billions of dollars annually. Policymakers are split on the effectiveness of harm-reduction strategies such as supervised "safe injection sites," but experts argue that the criminalization of drug possession won't solve that problem, especially since systemic inequities such as income disparity mean that Black adults are more than twice as likely to be arrested as are white adults.

For many parents, the big financial question—the "should we or shouldn't we" that hangs over every tragedy of an addicted loved one—exists outside of these debates. Severing financial ties with an addict isn't a treatment method, so whether or not it "works" is beside the point. It's not about "tough love" or "rock bottom," they say. It's about self-preservation and putting what's best for your family—and the future of every member—above the irrationality of an addicted brain.

There are plenty of stories like Diane's—parents who got help for themselves and, in the process, changed their child's life for the better. But often that's only after they've exhausted every other option.

"Families come to treatment with very unhealthy boundaries," says Ipek Aykol, a therapist in Newport Beach, California, who specializes in addiction counseling. "If you're giving your child money and your child is spending that money on drugs, it's not serving them."

Learning to love their daughter with healthy boundaries helped Katie and John Donovan.

THE DECISION TO cut off an addicted son or daughter comes with a list of ancillary, but equally pressing, questions.

Do we go cold turkey—to borrow a recovery phrase—*or cut them off in baby steps? Do we continue to pay for things that support a drug-free lifestyle, such as substance-abuse counseling, or sever all financial ties? What if they can't afford to eat? What if they're in withdrawal and ask for something as simple as a cup of coffee or a bottle of ibuprofen? Are we willing to watch them lose their home or wind up in prison? How long can we go without hearing from them? Are we being too harsh? Too selfish? What if they die?* To test the waters—and their own strength—some families start small.

"It's really hard in the beginning," says Katie Donovan, who lives in the suburbs of Detroit. "With addiction, anything can be a trigger."

Katie says her daughter, who is now an adult,

started taking pills as a teenager, which led to her snorting and eventually injecting heroin. For years, her daughter's life revolved around drugs. And for years, Katie's life revolved around her daughter—to the tune of about $200,000, she estimates.

When her daughter got a job, Katie set her own alarm to make sure she woke up for work. When her daughter's work uniform was dirty, Katie washed it and set it out for her to wear.

The rest of Katie's relationships, especially with her husband and younger daughter, were suffering. They were all stuck, in a way: rehab, relapse, repeat.

"I was interrupting my whole life, constantly, on a daily basis, to take care of her," Katie says. "I didn't realize that I had become a part of it. I was addicted to her."

Slowly, Katie started to unentangle herself from her daughter's life. She stopped doing things like buying all her clothes and making all her doctor's appointments. It wasn't easy, Katie says. "But when I started becoming stronger and saying no, she became stronger."

Eventually, Katie's daughter moved to a treatment center out of state and began an earnest journey toward recovery. She's had lots of success: one period of sobriety lasted three years. But nearly a decade after the addiction began, recovery was still an ongoing battle.

One night, Katie learned that her daughter had overdosed and was stabilized at a hospital in Florida. It was a call that would throw the most even-keeled mom into crisis mode, and usually, that's exactly how Katie would have reacted. Her daughter had overdosed about a half-dozen times before, and after each of those incidents, Katie lay in bed for days, unable to do—or think about—much else.

It's exhausting, trying to live a person's life for her. Once Katie stopped trying, she was able to start living her own life again. And this time, when she got the call from the hospital, she was equipped to handle it differently. The next day, Katie went golfing with her husband, as she had planned. The day after that, she went to a concert with friends.

Katie never cut her daughter off emotionally, she says. They call each other constantly and even run a blog about addiction together. But Katie has her own life now—and in order for that to continue, she can't be there for her daughter financially.

"It's easy to buy a car. It's easy to pay for court costs and to bail them out of every situation," she says. "It takes a very long time to gain the strength, courage, and faith to say no. I believe in loving with boundaries. She knows that emotionally, I accept where she's at—which, today, is 136 days sober. Am I going to give her money? No."

For families laboring over where, exactly, to draw the line, some decisions are easier than others. The street price of drugs varies—heroin goes for about $10 to $20 a bag, and painkillers like OxyContin cost at least $50 a pill. But since heavy users shoot, snort, or swallow drugs multiple times a day, parents who provide their kids a steady stream of cash can easily wind up bankrolling a $100-a-day habit, no matter what the drug. When parents realize this, their unconditional financial support tends to dry up quickly. Deciding whether to pay for rehab can be a much more fraught question.

SOMETIMES REHAB WORKS AFTER THE FIRST TRY, AND SOMETIMES AFTER THE 15TH.

The cost of rehab varies wildly by state, insurance provider, and services provided. Most out-of-pocket inpatient costs range from a few thousand dollars to more than $20,000 for a 30-day program—though a "luxury" center, the kind that a celebrity might choose, can top $100,000. Aftercare, recovery-speak for outpatient treatments such as methadone maintenance and counseling, can add thousands more to the bill.

Most rehab facilities offer sliding-scale fees, according to SAMHSA, and most insurance plans will reimburse a patient for a certain number of days. But some patients need to stay longer than their insurer is willing to pay for, and many return to treatment again and again. Eventually, even the best insurance runs out.

The thing about rehab is that it *can* work. Sometimes it works after the first try, and sometimes it works after the 15th. The good news is, there's not a lot of evidence to suggest that expensive, froufrou, pop star–caliber treatment gets any better results than the free kind provided by the Salvation Army. And despite aggressive marketing campaigns aimed at filling beds in rehab centers across the country, there's no way of knowing if a program will work for your kid at all. So picking a lower-cost rehab doesn't

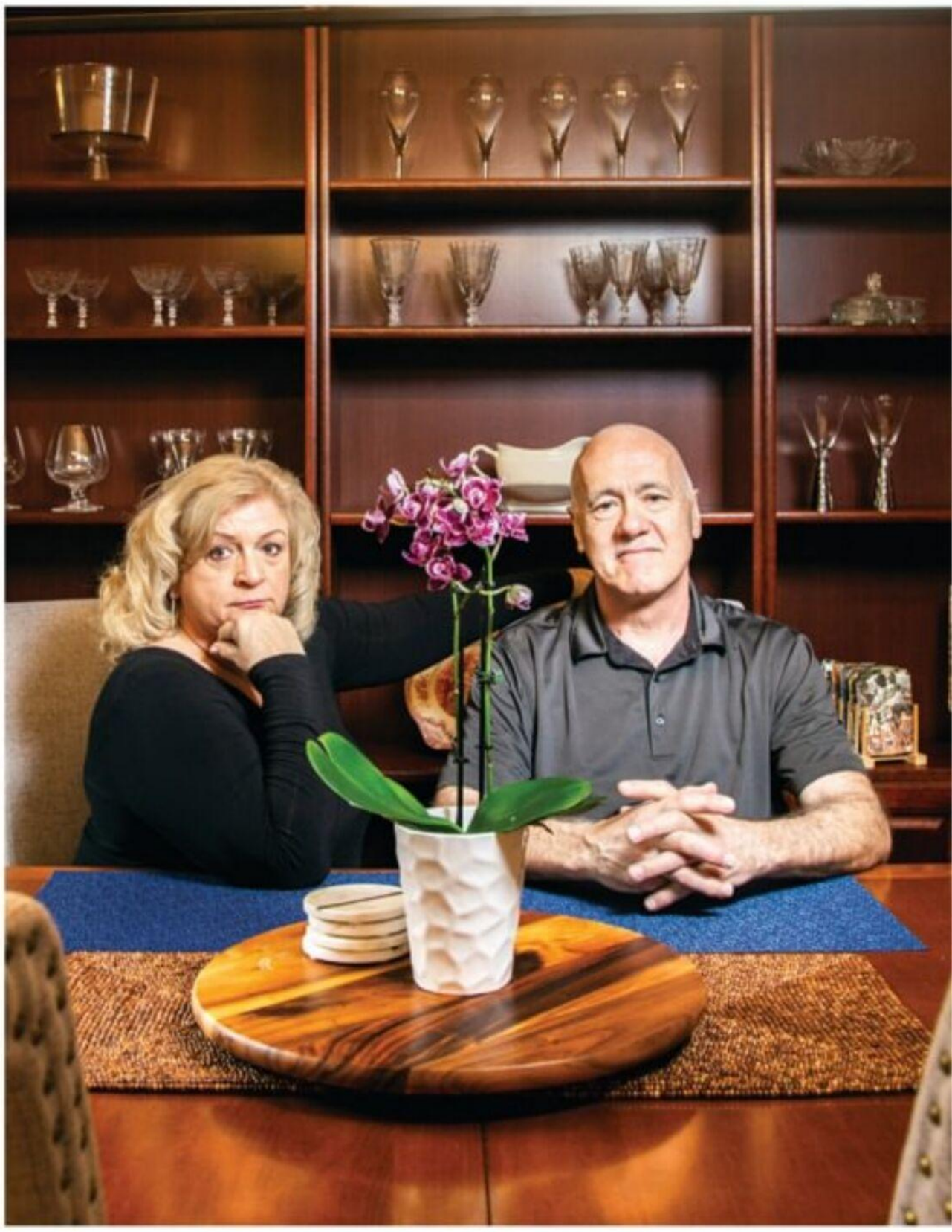
always mean picking a worse one.

For Fred Leamnson, a financial adviser in Fairfax County, Virginia, it took years to throw in the towel. Fred says he and his wife, Cathy, spent more than six figures trying to combat their son's battle with heroin addiction—starting with a $6,000 debt to drug dealers that they paid off.

Cutting him off financially was one of the hardest decisions the couple ever had to make. Sticking to it was even harder. "There's no playbook for this," Fred says. "Nobody understands unless they've actually been through it."

Fred writes a blog about personal finance—market commentary, mostly, and tips on financial planning. In the spring of 2018, he wrote an emotional post about his family's story and what he's learned from it. "We made so many bad decisions about our finances along this journey," he wrote. "The best advice I can offer is advice we didn't follow—protect yourself and your finances at all costs!"

It's a strong statement—far too definitive for many parents. But Fred stands by it, saying, "If you think [giving your child money] will speed the process of them getting better, you will likely be very disappointed. Their recovery is up to them." Since Fred's post, hundreds of parents with similar stories have reached out to him, and his son recommitted to recovery.



Cathy and Fred Leamnson say they spent more than six figures to fight their son's addiction before cutting him off.

KIM AND MICHELLE Humphrey went the slower, "baby steps" route. They canceled the family cellphone plan first and bought each of their sons a pay-as-you-go phone to fill up on their own as they pleased. Next came car-insurance payments and credit-card bills. Later, when their oldest son, Sean, was in treatment, they handed him a contract.

"They printed out a list of what they were willing to do for me," Sean says. "I was completely thrown off guard." Before the contract, "whatever I needed, they would help me with," he says. "Now I knew I couldn't just waltz over to their house whenever I felt like it."

For a long time, it was hard to tell how the Humphreys' story would end. Sean's health was failing, and he struggled with bouts of homelessness. One Christmas, as Kim and Michelle were getting ready to leave town for vacation, the telephone rang. Sean had been hospitalized with a viral infection—one of the risks of being an intravenous drug user.

This wasn't the first time the Humphreys had gotten this call. This wasn't even the first time Sean had been hospitalized on Christmas. So they made a decision that would have been unfathomable a few years earlier: They went on vacation.

For Sean, that was when things started to click. He knew he had gotten himself into the mess he was in and that this time his parents weren't going to bail him out of it. If he wanted them back in his life, he'd have to figure things out himself.

Sean left the hospital and checked himself into rehab. Andrew, his younger brother, went into recovery shortly after.

There were a lot of things that helped push Sean into recovery. Poor health and a good 12-step program probably had something to do with it. But what certainly didn't help, he says, was his parents' unwavering financial support.

"Before, they were helping me stay sick," he says. "Whether it was giving me money or driving me

to treatment centers, they were always trying to rescue me. None of that ever works, for anyone. The best thing they could have done to help is what they eventually did—getting help for themselves."

Kim retired from the Phoenix Police Department in 2014 and now works as PAL's executive director. There are currently more than 200 PAL groups across the country, and that number is growing. The organization gets as many as 50 inquiries a week from parents who want to start a group in their own community, Kim says.

As a father who lived through the horror of family addiction, Kim knows he can't take away the fear those other parents have—and he can't eliminate the risk that their kids will wind up in prison, or worse. But he can talk to them about his own experience and about how learning to support his sons emotionally, but not financially, contributed to their recovery.

A few years ago, an elderly couple attended a meeting of Kim's local PAL chapter for the first time. The couple's 56-year-old son was a heroin user. They had rented him an apartment, bought him a car, and paid for his car insurance. Every week, they stocked his fridge with fresh groceries. He couldn't do any of these things himself, they told the group. He was "incapable of it."

Kim had some ready—and hard-won—wisdom to share with them. "Here's the question that was once posed to me," he said. "Why is this guy not getting any better? The answer is really simple: because he doesn't have to." □

The Dollars and Cents of Beating Addiction

Google "How much does rehab cost?" and you'll realize how hard it is to put a dollar figure on the price of drug treatment. Sure, you'll find page after page of search results, mostly links to treatment centers fighting for your clicks—and your business—with the promise of "low cost" options and sliding-scale fees.

But you'll never find an actual price tag. There are just too many variables. Differences in a patient's condition, treatment needs, location, and insurance coverage create a web of confusion and a list of unknowns that people are forced to wade through, often while trying just to survive the day-to-day crisis that is addiction. It can cost from a few hundred to a few thousand dollars to receive treatment—sometimes $50,000 or more.

"The industry has not been set up in a way that makes it easy for the consumer," says Robin Gelburd, former president of FAIR Health, a New York City nonprofit. "You're comparing really complex things."

The cost of treating opioid addiction is particularly hard to gauge. Some patients seeking treatment developed an addiction to doctor-prescribed pain meds and now need alternative ways to deal with their pain. Some addicted people experience withdrawal more intensely, or for longer periods, than others. Some have co-occurring disorders, meaning they suffer from both mental-health and substance-use problems.

In general, the price of rehab varies from state to state, as does the type of rehab offered. While some parts of the U.S. have embraced therapies that hinge on medications like methadone and buprenorphine, others stress group therapy or outpatient health services (partial hospitalization).

"There are a lot of different pathways states are taking to address these issues," Gelburd says. "It's unbelievable what a tapestry exists in terms of approaches."

For many patients, insurance is the biggest headache. As with every other facet of health care, variations exist as far as what patients can expect coverage to include and how much they get reimbursed when they enter a rehab program. As a result, different patients pay different fees based on their particular insurance plan.

There's not a lot of data on how much the average person seeking this type of care ends up paying out of pocket, but we do know that facilities bill insurers at a much higher rate than the general population.

In 2018, the average billed insurance charge for patients with an opioid-abuse or dependence diagnosis was $78,045, compared with $9,992 for all patients, FAIR Health data shows. That's a $68,000 difference we're all footing—through higher premiums, overburdened emergency rooms, and a slew of other consequences.

"The health-care system is almost like an aspen forest," Gelburd says. "It looks like individual trees, but under the ground, the roots are all connected. So the costs that are borne in connection with the opioid crisis get spread out over everyone. We're all being asked to move that boulder up the mountain." —*K.B.*

Nic (left) and David Sheff wrote joint memoirs on Nic's struggle with addiction and David's challenge to cope.

Book Excerpt

A FATHER'S FIGHT FOR HIS SON

In his memoir *Beautiful Boy* and the film that is based upon it, writer David Sheff told the raw tale of his son Nic's addiction to methamphetamine, his frequent relapses, and his eventual recovery.

In the latter portion of the book, Nic has relapsed and is at large in the world with his girlfriend, identified in the book only as Z. His family does not know his whereabouts, nor does his former recovery sponsor, Randy. David Sheff lives in Northern California with his wife, Karen, and their children, Jasper and Daisy. Nic is the child of David's marriage to his first wife, Vicki.

Another week.

Vicki, with whom I speak daily, says that she is numb. I am, too. It's not that I don't worry about Nic—I think about him all the time—but for the moment I am not incapacitated.

Is this where parents wind up?

I walk past more people on the streets . . . I walk past them and step over them, people alone and abandoned, and, when I do, as always, I think, Where are their parents. But this time I wonder, Is this the answer? Am I becoming one of them—a parent who has accepted defeat? My agonizing has not helped Nic in the slightest.

I am not pretending that this isn't happening. I am doing all that I can do.

I wait.

A downward spiral.

It's a degenerative disease. I imagine the downward spiral.

No, I am not numb. I wish I were. Sometimes I feel overwhelmed.

I brace myself.

Randy continues to call Nic and leave messages on his dead cell phone. Randy was Nic's lifeline.

Using Z.'s phone, which is still working, Nic calls and leaves more messages. "I just want you to know we're safe. We're going to meetings. I'm getting sober."

He claims that the relapse was a one-shot, three-day mistake and he's fine. But the longer he talks, the more it becomes obvious that his voice is the voice of Nic on something.

I wait.

It's like watching from afar, perhaps through binoculars with imperfect lenses, the moments before a train wreck. All of us who love him commiserate. Karen and I. Vicki and I. Randy. We all know. And yet there's nothing we can do. I call Nic back. "Nic, don't forget how dangerous it is when you aren't attending meetings," I say. "Don't forget when you listen to the logic of your brain when it's under the influence."

In recovery, working with Randy, Nic was the one who explained the insidiousness to me: "A using ad-

dict cannot trust his own brain—it lies, says, 'You can have one drink, a joint, a single line, just one.' It tells him, 'I have moved beyond my sponsor.' It says, 'I don't require the obsessive and vigilant recovery program I needed when I was emerging from the relapse.' It says, 'I am happier and more complete than I have ever been.' It says, 'I am independent, alive.'" And so Nic said he couldn't trust his own brain and needed to rely on Randy, meetings, the program, and prayer—yes, prayer—to go forward.

Nic, you have come so far.

Let me quote you: "Everything I have will be gone if I don't stay with the program."

TWO DAYS LATER, on Wednesday, Nic calls up slurring and asks for rent money. No. He says that he knew I would say no. He saved it for the end of the conversation, after, "I love you so much. I'm safe. We really f---ed up but we're going to be fine now. I just took a little something to help me come down from the meth and coke and smack and. . ."

Vicki says no, too.

Now it is Friday. Nothing on Saturday. Nothing on Sunday.

Nothing until Monday, when an email arrives.

"hey pop, we're in the desert. Z is doing a commercial, out by joshua tree . . . my phone doesn't get any reception here and I just borrowed this computer for a second from some guy on the set . . . sorry . . . this came up really suddenly . . . anyway, i'll call you when i find a phone that works . . . it's hot, hot here and boring . . . z just doing wardrobe and i'm writing in the shade here . . . don't fret . . . i may have some exciting news too . . . love ya . . . nic"

Joshua Tree.

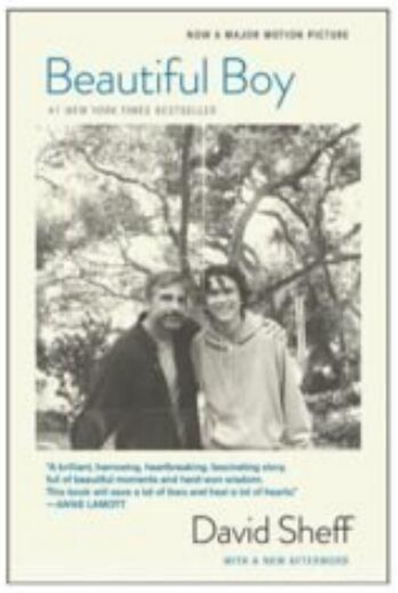
A respite. An oasis. Maybe Nic will stop on his own. Maybe he'll be OK.

Nothing for two more days, but Nic is in the desert, writing in the shade. There are drugs in the desert, too.

At night, Karen and I switch off reading to the kids. We are nearing the end of Harry Potter. Professor Dumbledore died. He is dead. More than one of the children we know cried for hours when they read this—Albus Dumbledore, Harry's protector, with whom these children grew up, is dead. Evil is winning, and I feel weakened by the ceaseless battle.

ON THURSDAY, JASPER has a soccer game after school. Daisy has swimming. Karen and I divide the driving.

I have found a quiet place in a corner of the clubroom near the pool to write. Looking up, out the window through the slats of shutters, I see a dark form curve up and break the water, followed by a pair of kicking feet: Daisy doing her laps. The coach, poised and tanned and lithe, a former All-American swimmer who has taught all three of our children, crouches at the end of the lane, encouraging Daisy and the other swimmers. I lose sight of her among the lines of bodies in their blue suits until she returns back down the lane in the opposite direction, her powerful arms pulling in arching freestyle strokes. I remember when it was her big brother Nic in the water, his lean dolphin body cutting through the pool.



THERE IS NO news. Some of the panic in which I lived during these crises seems to have lifted. I worry, but I am not sick with worry. I'm getting better. I'm letting go. I'm in abject denial.

It must be like a soldier in a trench during a bombing raid. I've shut down every nonessential emotion, concentrating every neuron in my new brain on the moment in order to stay alive.

I am in a silent war against an enemy as pernicious and omnipresent as evil. Evil? I don't believe in evil any more than I believe in God. But at the same time I know this: Only Satan himself could have designed a disease that has self-deception as a symptom, so that its victims deny they are afflicted, and will not seek treatment, and will vilify those on the outside who see what's happening.

After dinner, Jasper asks me to quiz him on math and his words of the week. Then he and I read a *Mad* magazine together.

In bed, I grab one of the novels on the tottering stack on the night table. I will never get through all the books. I'm so tired at night that I read a page, maybe two, and fall asleep. Karen joins me.

The telephone rings. I ignore it. In my half-consciousness I have decided that it's a serviceman we called for an estimate on some repairs. I think, It will wait until morning.

The phone rings again. I'll get the messages to-

morrow. No, Karen says, you had better check.

The first call is Nic's godfather. Nic just called him and left a message. "He's in Oakland." My friend's voice is in a state of alarm. "He says he's in trouble and needs help. I don't know what to do."

My heart pounds.

The next message is from Vicki. Nic called her, too, leaving a similar message. "I lied about Joshua Tree because I didn't want you to worry that I was in Oakland. I'm sober. Please, we're in trouble. We need plane tickets back to L.A." He tells a convoluted story about how they got there, but the bottom line is that he and Z. are at the home of a crack addict in Oakland who is out of his mind and they have to get out.

I return Vicki's call. She is unsure what to do—whether or not to pay for a plane ticket. I understand, but, no, I say. If it were me, I would not help unless he wants to go into rehab. Then maybe.

I hang up. I call my friend [Nic's godfather]. He is calmer than when he left the message. He says, "Listen," and plays the message on his answering machine over the telephone. We hear the slur in Nic's voice. "I need help. I can't call my dad. I don't know what to do, please give me a call." He leaves Z.'s cell phone number.

"It's so sad," my friend says. "Part of me wants to drive to Oakland to get him and part of me wants to wring his neck."

Once again, Nic is here and he is high. For some reason, I'm aberrantly calm as I think, If he is here, what might he do? Might he come to our house? What do I do if he does? Where else might he go?

The next day, Nic leaves another message for his godfather and one for his mother, this time saying that the girlfriend of the crack addict with whom they were staying showed up and gave Nic and Z. money to fly home.

I'm working at the Corte Madera library, a stack of books at my side.

I have brought my laptop and I'm writing and writing, an attempt to contain something that is fast (once again) spiraling out of control.

The phone is on vibrate because of the library and it starts its mad shaking and rattling as if possessed. I pick it up from the table so the noise doesn't disturb anyone. On the screen, in sickly green letters, I see that it's Nic's girlfriend's phone.

I have no desire to hear more lies. I turn it off.

Later, as I am driving to pick up the kids from school, I listen to the message. Nic says that he and Z. are driving back from Joshua Tree and are finally in cell phone range. He says, word for word:

"Hey, Pop, we're driving back from Joshua Tree and we're finally in cell phone range again . . ."

I am struck not just by the lie, but by its intricacy. He could have said, "I'm back in L.A." He could have checked in without saying any more than hello. But he thought through the original lie and built on it, bejeweling it with detail so that I would never question it. And I would not have if I didn't already know it was a lie. By now I have heard about the web of lies by addicts. "Substance abusers lie about everything, and usually do an awesome job of it," Stephen King once wrote. "It's the Liar's Disease." Nic once told me, quoting an AA platitude, "An alcoholic will steal your wallet and lie about it. A drug addict will steal your wallet and then help you look for it." Part of me is convinced that he actually believes that he will find it for you. I listen to the message a few times. I want to remember it.

"AN ALCOHOLIC WILL STEAL YOUR WALLET. A DRUG ADDICT WILL STEAL YOUR WALLET AND THEN HELP YOU LOOK FOR IT."

Did he forget that he called his mother and his godfather and told them that he was in desperate peril in Oakland? After everything, does he assume that my dear friend would not call me if he was worried about Nic, if Nic was desperately in danger in an Oakland crack house? Does he not know by now that his mother, with whom I have ridden this hellish roller coaster, will of course call to check in with me to talk about what, if anything, we should do? And not only about what to do. Just to talk to the other person who loves Nic the way she does.

The message continues. He's not slurring. He sounds fine. He says he misses and loves me. □

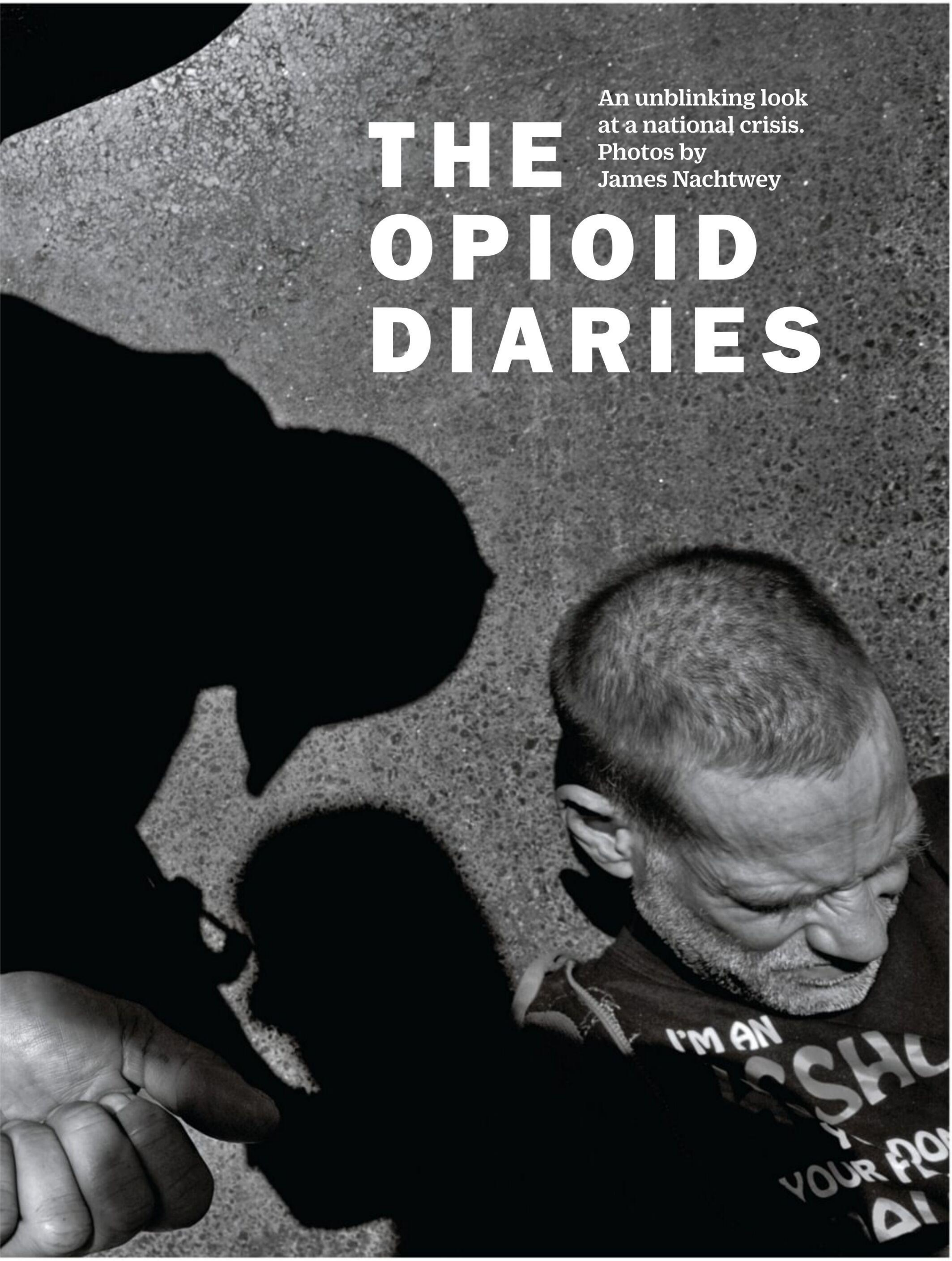
Excerpted from Beautiful Boy: A Father's Journey Through His Son's Addiction *by David Sheff. Copyright © 2008 by David Sheff. Reprinted by permission of Mariner Books, an imprint of HarperCollins Publishers. All rights reserved.*

"Once you're into heroin, it's almost like a relationship with a person you love. And letting go of that, the thought of never seeing someone I love again—I couldn't imagine giving it up forever. But at the same time, I want to do something with myself. I feel like I have a lot of potential."

DAN, *not pictured, a homeless drug user in the South of Market neighborhood of San Francisco, where open-air drug use is frequent. This photo was taken there on January 31, 2018.*

THE OPIOID DIARIES

An unblinking look at a national crisis. Photos by James Nachtwey



"THE FACT THAT HE'S STILL ALIVE MEANS THAT there's hope," says Kristina Barboza from her living room in East Wareham, Massachusetts, 50 miles and a world away from where her son Billy sleeps beneath a Boston overpass. In Huntington, West Virginia, firefighter Larry Kishbaugh—haunted by the many overdose scenes he has rushed to—has been diagnosed with post-traumatic stress disorder. Inside a holding cell at the Kenton County, Kentucky, detention center, where drug users are left to detox, young mother Kayla Rauck wonders if she'll ever see her children again.

It is hard to fathom, and bitterly ironic: the depth of the suffering caused by drugs whose ostensible purpose is to alleviate pain. Statistics offer a partial view of the wreckage. In 2024 alone, more than 80,000 Americans died from a drug overdose—more than were lost in the entire Vietnam, Iraq, and Afghanistan wars combined. Far more come close but are revived by naloxone, a lifesaving antidote that has become nearly as critical to a cop's job as handcuffs.

But numbers aren't neighbors, and it is far too easy to become numb to their scale. We are in the midst of a national emergency that affects every state, every income group, and virtually every age. While the burden has fallen disproportionately on the least-educated Americans, tens of millions of us are no more than one degree of separation from someone struggling with addiction. As Walter Bender, a deputy sheriff in Montgomery County, Ohio, put it, "It reaches every part of society: blue collar, white collar. It reaches everybody."

This feature for TIME, adapted from an issue that was the first in the magazine's 95-year history devoted to the work of a single photographer, goes beyond charts and policy. Over more than three decades, James Nachtwey has photographed war, famine, and terror around the world for TIME. In 2017, the magazine asked him to bear witness to a pressing human crisis in his home country. Nachtwey and TIME's Paul Moakley spent months on the streets of Boston and San Francisco; on patrol with first responders in Ohio, New Mexico, and West Virginia; inside jail cells in Kentucky; and at funerals in New Hampshire and prayer meetings in Massachusetts. They made thousands of pictures and videos and conducted more than 200 interviews. The result is a human accounting of the toll opioids are taking on American life, the people behind the statistics.

WE NEED TO RECOGNIZE THAT ADDICTION IS A DISEASE.

At his mother's kitchen table in Miamisburg, Ohio, Chad Colwell, then 32, noted how quickly the cycle can begin. "I played football in high school, and my knee and my back got injured," he said as his 3-year-old daughter played outside. "I got prescribed painkillers, Percocet and OxyContin, and then it just kind of took off."

Prescriptions soon gave way to cheaper, stronger alternatives. Why scrounge for a $50 pill of Percocet when a tab of heroin could be had for $5? Synthetic opioids are even more potent—and a potentially fatal dose costs less than a Big Mac. On July 4, 2017, emergency workers saved Colwell after he overdosed in the driver's seat of his truck. He says it was his fourth OD.

Inside a rehab facility in West Virginia, Jason Burgard told of a similar spiral. "When the pain gets great enough, you get so desperate just to feel OK," he said. "A lot of people say drugs or alcohol

An inmate at the Kenton County Detention Center Covington, Kentucky, attended a group meeting on December 8, 2017. He was part of a voluntary rehab program at the jail.

eventually stop working, that they don't cover up pain as well toward the end. But heroin works. Heroin does its job."

The toll is also high for those who deal with what happens after the heroin does its job. Fire departments have been transformed into mobile emergency rooms. Police now carry drugs that block the brain's opioid receptors, lest they themselves drop dead from an accidental sniff of confiscated Carfentanil. High schools have started to stock up on naloxone, with principals getting trained to administer the emergency drug. "Our job has changed completely in the last seven to 10 years," said Jan Rader, the former fire chief of Huntington, West Viriginia. "We learned how to fight fire and cut people out of cars, but it's not going to go back to that."

The pain is deepest for the families of users, whose lives are swept up in fear and hope, shame and despair. "I felt embarrassed, like, 'What did I do?'" said Justine Gingras-Gagnon, whose daughter Michaela struggled with addiction before she died at age 24 in 2017. "Even though she was drug-addicted, she was just so alive. She was funny, she was smart. She was a 5-foot-1, 103-pound dynamite."

The actor Philip Seymour Hoffman, who fatally overdosed after years of battling addiction, left behind a family. "When Phil died … I was so overwhelmed, vulnerable, and cracked open that anger became my protective shield, the only thing between me and collapse," wrote Hoffman's wife, Mimi O'Donnell, in an essay for this project. "I wondered if I had talked to more people, asked for more help—screamed louder—if it would have saved his life."

In the absence of an effective national initiative, Americans have gone to extraordinary lengths to help where they can. They bring food, medical supplies, and clean needles to kids living on the streets of San Francisco. They steer people into treatment programs and out of the ill-equipped prison system. They adopt their own grandchildren or foster kids whose own families can no longer care for them. Kristina Barboza is one of thousands of parents clinging to hope. "There are miracles that happen every day," she said. "There are people who have gone down so far and have found their way out."

Finding a way out of the crisis will not be easy, particularly at a time of partisan division, when national will is so hard to muster. But the need to act is urgent, and the map is increasingly clear. First, we need to recognize that addiction is a disease. The opioid epidemic must be seen as a public-health crisis rather than a moral failure. That means expanding access to medically assisted treatment and counseling. We must enhance efforts to reduce the supply of drugs through the work of law enforcement, by regulating lawful prescriptions, and by encouraging other strategies for managing pain. And finally, we need to confront problems such as the growing economic divide, unaffordable health care, and diminished employment opportunities for those without a college degree who are helping fuel demand in the first place.

This will be a massive undertaking. To see the faces and hear the stories of those with the most at stake is to begin to reckon with the crisis. As Nachtwey once put it, "We must look at it. We're required to look at it. We're required to do what we can about it. If we don't, who will?" □

‘You can’t dispel stigma with billboards. You can’t dispel stigma with hashtags. What’s happening right now is exactly what happened during the AIDS epidemic. We didn’t learn our lessons.’

SARAH MACKIN, *not pictured, director of AHOPE, a city harm-reduction and needle-exchange program in Boston. The initiative helps drug users like the woman above. She was photographed struggling to inject herself in the freezing cold on January 14, 2018.*

I Am a Father

By Billy Merrifield

AS MY DAUGHTER STARTED GETTING OLDER, IN high school, the boyfriend thing came around. She ended up meeting one of these guys who was a user. And of course, once she hit 18, it was kind of difficult to give her direction. Anytime I confronted her, she would deny it. I mean, she was always telling me, "Dad, I made a mistake. I don't need help. I tried it a few times. I'm going to stay away from it." That was her constant: "Trust me, Dad, I can fight this. I can beat it." I remember telling her one day, "I'm to the point that I'm preparing myself for getting a bad phone call about you." So I kind of prepared myself for it.

You can be as mentally and physically tough as you want to be. I think I've seen a lot. I've probably seen a lot more than a lot of people. And I've experienced a ton. You can't prepare for it, though. When it comes to your own child, I cannot express the feeling and the loss. It never gets easier. Because that void will always be there. Our children are supposed to bury us—we're not supposed to bury them.

BILLY MERRIFIELD, *a captain with the Rio Arriba County sheriff's office in New Mexico, visited the grave of his daughter Brandi on February 4, 2018. She died from a heroin overdose at age 22. In April 2025, Sheriff Merrifield died from toxic effects of fentanyl and ethanol.*

CHAPTER 3

The Stori

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Addiction is pervasive on movie screens and in the pages of novels. But these stories also play out in real life, often among great innovators struggling behind the spotlight.

FICTIONAL ADDICTS, REAL PAIN

In literature, television shows, movies, and elsewhere, we have been captivated by characters struggling with their addictions—and we've learned a lot from them too. By Emily Joshu

AS JACK KEROUAC CRANKED OUT THE FIRST DRAFT of the postwar classic *On the Road* on 120 feet of taped sheets of paper in 1951, in what is said to have been a three-week, Benzedrine-and-wine-fueled mania, his melancholy protagonist, Sal Paradise, slipped into despair. Echoing the buzz, if not the frenzied mood, of his creator, Paradise's voice unfolded on the scroll. "I forgave everybody, I gave up, I got drunk," he laments. "Everything was falling apart." Two years later, as Kerouac tore through more drafts, William S. Burroughs published his semiautobiographical *Junky*, in which his drug-peddling antihero declares that heroin is not "a means to increased enjoyment of life. . . . It is a way of life."

Stories about addicts—sometimes penned by addicts—are not a phenomenon exclusive to the Beat Generation. In decades before and after Kerouac and Burroughs wrote, addiction has been one of the most prevalent and romanticized flaws with which writers have plagued their characters. From tales of cocaine dabbler Sherlock Holmes to unraveling alcoholic Fiona Gallagher of TV's *Shameless,* their lives have played out in turns of triumph and downward spiral. Here is a look at some of the most memorable of these troubled characters.

Sherlock Holmes

IN THE EARLY 1880S, DURING THE EMERGENCE of psychoanalysis, Sigmund Freud began using a radical new tool in his practice: cocaine. Prescribing it to patients during a career rut, Freud pioneered the normalization of cocaine as a painkiller and tool for (fleetingly) energizing mental function. Around the same time, a doctor named Sir Arthur Conan Doyle, who was aquaintance of Freud's, began crafting his tales of literary enigma and cocaine addict Sherlock Holmes. "I suppose that its influence is physically a bad one," the famed Victorian detective tells his partner, Dr. John Watson, of the drug in the 1890 short story "The Sign of the Four." Holmes was right, but he adds, "I find it, however, so transcendently stimulating and clarifying to the mind that its secondary action is a matter of small moment."

The self-proclaimed independent consultant and unmatched master of deduction Holmes injects himself with a "seven-percent solution" of cocaine, his "forearm and wrist all dotted and scarred with innumerable puncture-marks," as Watson narrates. The choice to give an otherwise unflinching and pragmatic detective a drug problem could be

Sherlock Holmes (here played by Basil Rathbone in 1939) is one of the earliest addicts in fiction.

attributed to Conan Doyle's medical background and supposed familiarity with cocaine as an anesthetic. Similar to the cases he unravels, the sleuth's own perception of cocaine is shrouded in mystery and is often contradictory. Holmes refers to his syringe as an "instrument of evil," but he succumbs to its ability to help him "escape from the commonplaces of existence."

Though Holmes's addiction was a sign of the era's ambivalence toward cocaine, many literary critics believe it sheds light on the character's moral ambiguity. With such a fatal weakness as part of a character with almost superhuman deduction, the drug humanizes Holmes and shatters his veneer of perfection. But his use came at a price. In 1968, the *Journal of the American Medical Association* published "A Study in Cocaine: Sherlock Holmes and Sigmund Freud," by drug-policy historian David F. Musto, who suggested that Holmes's use of cocaine created a sense of severe paranoia about his primary enemy, Professor James Moriarty.

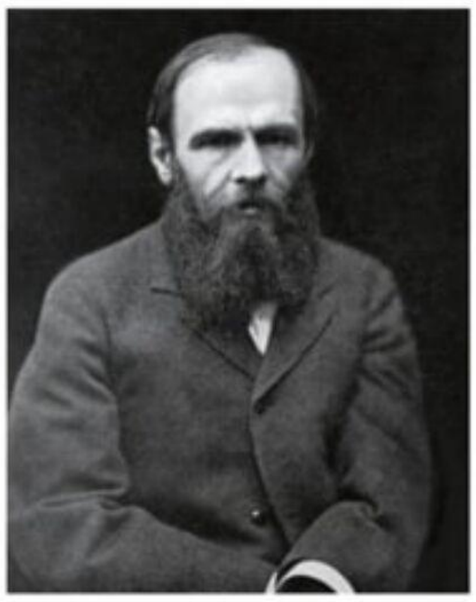
Rebecca Bloomwood

WANNABE FASHION JOURNALIST REBECCA BLOOMwood (played by Isla Fisher) owes her redemption arc to a green scarf and irony. In the book series and movie *Confessions of a Shopaholic*, Bloomwood finds herself with a maxed-out credit card and an obsession with the $20 scarf (which she borrows money to pay for) that she insists is necessary for an upcoming interview with her dream fashion magazine, *Alette*. After being rejected for that job, she gets an interview with the editor of financial magazine *Successful Savings,* who had given her the money for the scarf and soon gives her her own column too. Despite the editor's apparent belief in Bloomwood's money-saving habits, she is buried in $16,000 worth of credit card debt.

Unlike many fictional addicts, Bloomwood navigates her redemption relatively easily. She manages to downsize enough to pay her debt off in its entirety and even strikes up a romance with her editor. However, she never actually admits to having an addiction and instead merely acknowledges that the high from succumbing to an expensive price tag fades, but the bills remain. "When I shop, the world gets better. And then it's not, and I need to do it again," she says. Upon the film's release, about a year after the 2008 recession hit, critics deemed

the narrative unrealistic and bland. TIME's Mary Pols said in her review, "As a romantic comedy, it is forgettable. But as an ill-timed anthropological artifact, *Confessions* offers weird pleasures, not least among them the fact that it makes us root for the debt collector."

Bloomwood's compulsive shopping did, at the time, offer insight into an insatiable consumer culture that would drastically alter modern retail habits over a decade after the movie hit theaters. Today, in the age of one-click shopping, same-day delivery, social-media BUY buttons, and an overwhelming number of subscription services, Bloomwood's shopping addiction seems a bit quaint. But when 6 percent of Americans have been estimated to be shopping addicts, her addiction may have been a portent of many others.



While Confessions of a Shopaholic *and* Mad Men *depicted addiction in subtler, more understated ways,* The Gambler *is a grim tale that dovetails with Dostoyevsky's own struggle.*

Alexei Ivanovich

A GIANT OF 19TH-CENTURY RUSSIAN LITERATURE, Fyodor Dostoyevsky was a master narrator of vice, aristocracy, and games of chance. In his 1866 novella *The Gambler*, he follows nobleman Alexei Ivanovich's financial and moral descent in a fictional gambling spa in the aptly named Roulettenberg. A tutor to a general's children, Alexei falls madly in love with the general's stepdaughter, Polina (who is, presumably, named after the author's longtime mistress). At Polina's request, he places a bet in a game of roulette and wins. However, he slips further and further into the habit until he loses his job, the love of his life, and all sense of financial security. His urge becomes irresistible, as he says: "Even on my way to the gambling hall, as soon as I hear, two rooms away, the clink of the scattered money, I almost go into convulsions."

As Alexei descends further into addiction, the general too has a mound of gambling debt to tackle. He agonizes over the inheritance he expects his wealthy great-aunt to leave him, falling into despair when the aunt, also known as "Granny," has also lost much of her wealth to roulette. Both Alexei and the general fall into a cycle of gambling to keep themselves afloat—precisely the pattern too many real-world compulsives adopt—and never quite get ahead. Alexei explains the deeper appeal of risking it all on games of chance:

"No, it was not the money that I valued. What I wanted was to make all this mob of Heintzes, hotel proprietors, and fine ladies of Baden talk about me, recount my story, wonder at me, extol my doings, and worship my winnings." That too is a painful echo of the real world.

The Gambler not only creates a portrait of greed but also dovetails with the writer's own vice. Per a formal contract, Dostoyevsky finished the project in 1866 under a strict deadline to pay off the gambling debt he owed to prominent publisher and editor F.T. Stellovsky. If he didn't deliver on time, Stellovsky would acquire the rights to his work for nine years without compensation. With the assistance of a stenographer, Dostoyevsky met the deadline with just hours to spare. But writing about characters with a crippling roulette addiction did not help him cure his own. Writing to his brother, Mikhail, he said, "I believed in my system . . . within a quarter of an hour I won 600 francs. This whetted my appetite. Suddenly I started to lose, couldn't control myself, and lost everything."

Don Draper

MANHATTAN, THE 1960S, A MADISON AVENUE high-rise. It was an era of dry martinis, thick cigars, expensive suits, and promiscuous late nights. For *Mad Men* antihero Don Draper (Jon Hamm), this landscape is familiar—and destructive. The charismatic advertising executive is considered by his colleagues to be the greatest among them at pitching copy, but as the series unfolds, he ends up in a downward spiral of alcohol, cigarettes, and sex. The drinking, however, is the smooth talker's most suffocating vice. According to Detox.net's "Drunk like Don Draper" infographic, Draper downs 52 drinks during Season 6, which is about three drinks per day. However, based on the CDC's definition of a drink based on alcohol content and glass size, Detox.net estimates that he really had about 164 drinks (and those are only the ones we see).

While drinking serves mainly as part of the ambience of after-hours socializing and glossy business deals in early seasons, as the series progresses,

From left: Shameless*'s Fiona Gallagher descended into substance abuse much like her father, whereas Gregory House of* House *mirrored the behavior of detective Sherlock Holmes.*

Draper slips deeper into alcoholism, shown most notably when he gives a drunken pitch for Life Cereal. He eventually gets suspended from his job, is tossed in jail, and punches a minister. In addition to drinking, he shows consistent signs of sex addiction throughout the series, cheating on his wife as early as the first episode. This might be seen as even more devastating than the cocktail, as the string of sexual exploits plays a larger role in breaking up his family and sense of morality than the drinking does.

Eventually, life mirrored art, as Hamm fell prey to his character's vice and checked himself into rehab for alcohol abuse in 2015 after eight years in Don's shoes—or, rather, suit. In an interview with *Variety*, Hamm said, "Playing this guy does not come without its own difficulties. It's not fun to live in this guy's headspace year after year."

Don Draper has been cited by TV critics as a symbol of 1960s power-hungry decadence in a culture of overconsumption. Full of promise and power, the intoxicated adman ultimately collapses under extreme pressure, narcissistic ambition, and the fallacy that he can have it all. "He's not a malicious, uncaring guy, but he's very defended. And that's alcoholism—when the feelings get even a little bit intense, boom: bottle. Happy, sad, painful, whatever," Scott Bienenfeld, CEO and medical director of Rebound Brooklyn, told *Esquire*. "He represents this era of excessive consumption and a bottomless search for fulfillment."

Fiona Gallagher

FIONA GALLAGHER (EMMY ROSSUM) SPENDS HER formative years through the first few seasons of the Showtime hit *Shameless* swearing to be better than her father, lifelong junkie and alcoholic Frank Gallagher (William H. Macy). After her mother abandons Frank and their six children, Fiona assumes the role of primary caretaker at just 16 years old. But in the whirl of keeping her siblings out of trouble in Seasons 8 and 9, she succumbs to several of her parents' toxic habits, including occasional cocaine use, casual sex, and clubbing.

Her self-destructive decisions cause her to get wrapped up in an unraveling string of odd jobs, criminal charges, and sexual exploits, and in later seasons, Fiona begins to replicate her father's alcoholism. After a night of heavy drinking, she stumbles to the doorstep of her newest flame, only to be greeted by his wife and child. Hysterical, she crashes into a parked car. This causes her to plunge further, going as far as stealing her father's liquor when she finds him passed out on the floor, losing her job, drinking in the shower, getting arrested, and assaulting a woman who harasses her brother Liam. The first step in her road to recovery? Waking up hung over and passed out next to her father. Horrified by the idea of turning into Frank, she starts attending Alcoholics Anonymous meetings.

Dr. Gregory House

CONSIDERED A 21ST-CENTURY HOMAGE TO Holmes, Dr. Gregory House (Hugh Laurie) combines deduction and medicine as a brilliant diagnostician on the TV series *House*. As a nod to "home" and a play on "Holmes," as confirmed by show creator David Shore, not only is *House* named for the famous detective, but its titular character shares the same apartment number (221B), draws support from just one true friend—Dr. James Wilson (Robert Sean Leonard)—and possesses an unrivaled talent for cracking unsolvable cases. He seems to be impaired only by his sour attitude and an addiction to pills.

After suffering a blood clot in his leg, which resulted in muscle death, five years before the series begins, House rejected the idea of amputation and instead, per the instructions of his partner while he was in a medically induced coma, had the dead muscle removed, leaving him with excruciating pain and a reliance on Vicodin. House acknowledges that he has lost control and is unable to function without the pills, whereas his Victorian counterpart Holmes never does, mainly using drugs as a boost to his detective skills and a way of combating boredom. Still, concealed by his usual veil of sarcasm, House remains unsympathetic toward other addicts, stating, "On average, drug addicts are stupid."

House makes no attempt to conceal his behavior, and although he says that the pills merely "let me do my job, and they take away my pain," he often goes to extreme lengths to get a fix—punching another doctor, committing forgery with Wilson's prescription pad, and stealing medications from dead patients, among other ugly incidents. Though House has admitted to using drugs before his injury, his colleagues often wonder whether his arrogance and callousness are the product of addiction or part of a dark, unhappy personality that drove him to drugs in the first place. It's a cause-or-effect question that comes up among real addicts too.

Despite his cynicism, House ultimately regrets not having his leg amputated, which likely would have helped him avoid ever taking Vicodin. In Season 6, he warns a woman refusing amputation against making the same choice he did. "I'm in pain. Every day," he says, "and it changed me. Made me a harder person. A worse person. And now, now I'm alone." □

Beyond Fiona's descent, *Shameless* portrays addiction as a family disease. Critics have associated five of the Gallagher siblings with personality subtypes found in adolescent and adult children of alcoholics, diagnoses validated by two studies from the National Institute of Mental Health. The subtypes include the Enabler (Rescuer), the Hero, the Scapegoat (Rebel), the Lost Child, and the Mascot. In a blog post from one rehabilitation organization, the Cabin Group, Fiona is compared to the Hero because of her reputation as responsible peacekeeper of the family, though her under-the-influence decline compromises this. Her ultimate fate remains uncertain, however. She departed the series at the end of Season 9, and viewers were never given an update on Fiona's status when the show concluded in 2021.

THE ADDICTED CREATIVE

Creativity and addiction have long seemed linked. Why do great art and great pain so often go together? By Eileen Daspin

IT IS A DISTRESSINGLY FAMILIAR RITUAL IN America. A famous musician or writer or actor admits to an addiction and checks into a rehab facility—or, more tragically, dies of an overdose. A flurry of media coverage follows. The stories include lists of other creative types who've fallen prey to the addiction at hand—whether it's drugs (Prince, Philip Seymour Hoffman), alcohol (Carrie Fisher, Stephen King), sex (actor David Duchovny, comedian Russell Brand), gambling (*Deadwood* creator David Milch, singer Gladys Knight), or shopping (journalist Buzz Bissinger, Michael Jackson). In the aftermath, there may be an autobiography chronicling the road to recovery. Or an interview. Or an appearance in a public service announcement. Or a relapse.

And always, an implied question arises: Is there a link between addiction and creativity? Given the frequency of such tragedies, it's impossible not to wonder. Not all celebrities who overdose are addicts. But between 2000 and 2015, the number of drug-related celebrity deaths nearly doubled, a spike that researchers have tied to the rise of prescription opioids. In 2018, rapper Mac Miller, Dolores O'Riordan of the band the Cranberries, and actor Verne Troyer, all self-admitted addicts, died from drug use or incidents related to alcohol abuse. Brad Pitt indicated in an interview that alcoholism was part of what led to the demise of his marriage to Angelina Jolie. And in 2013, after spending more than half a million dollars on designer clothing, Bissinger detailed his "Gucci addiction" in an essay in *GQ*. "I see the collection, and the pheromones of hot clothing defeat the part of the brain that rations rationality," Bissinger wrote of attending a Gucci fashion show in Milan. "There is the deliciousness of desire . . . I have to have it. I don't have to have it. I need it. I don't need it."

Bissinger, the author of *Friday Night Lights*, a nonfiction best-seller that chronicled the experiences of a small-town high school football team in Texas and was later made into a popular film and hit television series, could likely afford to indulge his impulses. And like a lot of celebrities, he did.

There are certainly unique pressures on high-profile creative types that can lead to addictive behavior. Celebrities' daily lives are scrutinized by the media, as are their relationships, work, successes, and failures. They may see themselves in acute comparisons to their peers, often unfavorably, and in equally painful comparisons to their younger selves. Some have to overcome stage fright or conquer writer's block. Others may feel the need for solitude to create their work.

"ADDICTS SEEM TO WANT [PLEASURE] MORE BUT LIKE IT LESS."

—David Linden, PhD

Unfamous creatives may feel that kind of pressure too. In 2017, reacting to media reports of drug abuse among artistic types, researchers from Eotvos Lorand University in Budapest surveyed a group of university art students and a group of non–art students about their drug habits to see how the two compared. The art students, presumably the more creative group, reported that they had tried more types of illegal substances than their non-art peers, that they began taking them at a younger age, and that they used them more frequently. The survey's authors offered theories on why creatives might turn to illegal

Like addiction, creativity cannot be isolated by just one gene or catalyst—both are unique.

drugs—to reduce anxiety, to see the world from a different perspective—but said there was no evidence that creative ability by itself leads to drug abuse.

In fact, hard science says there is no confirmed causal link between artistry and addiction, according to David Linden PhD, a neuroscientist at Johns Hopkins University, who has researched the topic. But there are hints. Studies of heredity, most significantly between twins, show that 40 to 60 percent of a predisposition to addiction is genetic. There is no single addiction gene, just as there is no single creativity gene, but scientists are beginning to understand that a specific genetic suite sets the stage for these traits. The ones associated with addiction are connected to the release of dopamine, the neurotransmitter that plays a role in motivating behavior. It is dopamine that rewards us with good feelings when we eat something delicious, when we have sex, when we have positive social experiences.

Addicts become addicted not because they derive pleasure strongly from gambling or drugs or sex, but because they feel pleasure more weakly—a theory referred to as the blunted dopamine hypothesis. They may drink more, shop more, or do more drugs because that's what it takes to bring them joy. Linden, the author of *The Compass of Pleasure: How Our Brains Make Fatty Foods, Orgasm, Exercise, Marijuana, Generosity, Vodka, Learning and Gambling Feel So Good*, put it this way in a conversation with *Scientific American*: "Addicts seem to want [pleasure] more but like it less," he said.

In this scenario, creative types may similarly be seeking a rush that comes to others more easily. People with a low-functioning dopamine system are more inclined to take risks, seek novelty, and act compulsively. None of these behaviors are explicitly creative, but they can be a catalyst for creativity, Linden said in the same interview. "Novelty-seeking might be a spur to creativity. Risk-taking might lead you to go more out on a limb," he said. "If you're compulsive, you might be more motivated to get your art, science idea, or novel out into the world."

LITERATURE ON THE link between creativity and addiction lends support to the connection, with reports dating back at least to the beginning of the 19th century. One early record is that of Thomas De Quincey. In 1804, De Quincey, then 19 years old and a student at Oxford University, had been prescribed opium to relieve excruciating pain from facial neuralgia. It's uncertain whether the drug had the desired medicinal effect, but De Quincey nonetheless kept using it. For eight years, it heightened his enjoyment of books, music, solitude, and urban wandering. But inevitably he succumbed to addiction. "Oh! Heavens! . . . What an upheaving, from its lowest depths, of the inner spirit! What an apocalypse of the world within me!" De Quincey wrote in what might be the first modern drug memoir, his *Confessions of an English Opium Eater*, which was published in 1821.

About the same time that De Quincey was battling opium dependency, a wave of Europeans were experimenting with hashish, compliments of Napoleon Bonaparte. Expelled from Egypt in 1801, the general and his troops returned to France with

samples of what the Egyptians called *dawamesk*, a jam made from cannabis, vanilla, pistachios, almonds, and musk. By the early 1840s, dawamesk—with its sensory-expanding qualities—was catching on throughout the French population, and psychiatrist Jacques-Joseph Moreau wanted to understand its impact on the nervous system. In Moreau's view, the drug fostered an "intellectual intoxication" superior to the "ignoble heavy drunkenness of alcohol," but he needed to test his theories on others.

According to the book *Cannabis* by Jonathon Green, Moreau sought out artistic-minded volunteers and contacted Theophile Gautier, a French philosopher and writer. Gautier in turn recruited a group of his friends to take the experiments a step further. It was quite the circle: Among them were the writers Alexandre Dumas, Victor Hugo and Honoré de Balzac; the poet Charles Baudelaire; and the painter Eugene Delacroix. The group called itself the Hashish Club, and from 1844 to 1849, they gathered monthly at a Parisian hotel, dressed in Arab clothing, to drink coffee laced with hashish or eat dawamesk spread on bread and discuss their reactions.

While the dawamesk made an impression on members, heightening their senses and filling them with "languorous wonder," as Baudelaire put it, they were clear-eyed in their assessment of the drug. In an article titled "Artificial Paradise," Baudelaire captured hashish's allure and dangers. "At first, a certain absurd, irresistible hilarity overcomes you. The most ordinary words, the simplest ideas assume a new and bizarre aspect," the poet wrote. But in the end, Baudelaire concluded that the hashish taker would likely suffer consequences. "Wine exalts the will," he wrote. "Hashish annihilates it."

Ironically, although Baudelaire and his confreres avoided hashish addiction, the poet later succumbed to laudanum, alcohol, and opium. And he had plenty of addictive company among the 19th century's creative class. After playing roulette for the first time while on vacation in Germany, Russian writer Fyodor Dostoyevsky gave in to a debilitating gambling problem that almost ruined his life. He was forced into debt more than once and had to write as quickly as possible to secure the money needed to pay creditors. He even pawned his wedding rings and his wife's valuables. His fellow novelist, Leo Tolstoy, was a sex addict, whose diaries painfully chronicle the illness: "I'm disgusting," Tolstoy wrote, flatly and brutally.

BISSINGER MAY NOT be Tolstoy or Hugo or Dumas—something he would likely concede—but in his *GQ* essay, he sounds similar themes to those of the writers who came before him. He needs stimulation, he wrote, "to create, to survive. Without it I feel dead, useless, overcome by the worst anxiety of all, nothingness, dead man walking."

GENERALLY, ADDICTION ERODES FOCUS AND DISCIPLINE.

Friday Night Lights was published when Bissinger was 35. Twenty years later, he said, "the words were harder to find," and he grew anxious he would never repeat his earlier success. Then he discovered the power of clothing, which, as he put it, was "hot and beautiful and transformative, a new sense of self-expression that I finally had the courage to realize. I hated khaki pants. Clothing became the stimulation and attention I craved." Bissinger started binge-shopping online as an antidote to any mood—"feeling anxious, feeling depressed, feeling flat, feeling excited, and desperately wanting another excitement hit." He shopped his favorite websites constantly, clicking BUY during the workday instead of writing, in bed before going to sleep, while waiting to meet a friend at a bar. Sometimes he bought the same item twice, having forgotten he owned it already.

After the *GQ* story was published, Bissinger checked himself into rehab for various addictions. His most recent book, *The Mosquito Bowl,* about football, the Marine Corps and WWII, was published in 2022.

Generally, as with Bissinger, addiction erodes focus and discipline, which isn't conducive to

Singer Dolores O'Riordan died in 2018 of drowning after excessive drinking.

Rapper Mac Miller struggled with substance abuse throughout his career before his death in 2018.

the creative act. But there are great works that have come out of binges. The Beatles experimented extensively with LSD, and John Lennon spoke openly about composing some of the trippy 1967 song "I Am the Walrus" while high on the hallucinogen. Some of Willem de Kooning's most famous paintings were fueled by alcohol, and Stephen King has admitted that he wrote *Cujo*, his 1981 horror classic, while in a spiral of cocaine and alcohol addiction. He has said he barely remembers writing the bestseller, about a once-friendly Saint Bernard bitten by a sick bat.

"I don't say that with pride or shame, only with a vague sense of sorrow and loss," wrote King, now sober, in his memoir, *On Writing*. He added: "Creative people probably *do* run a greater risk of alcohol and addiction than those in some other jobs, but so what? We all look pretty much the same when we're puking in the gutter."

There are factors aside from low dopamine that may push an individual toward creativity. Creative people tend to process information differently than the rest of us, according to Harvard researcher Shelley Carson. Most people, Carson says, have filters to block out the vast amount of data that streams into our minds. But highly creative people let a lot more information in, so they have to process and organize the information in unusual ways, a trait referred to as "cognitive disinhibition." Businesspeople, who bring a different kind of creativity to their work, might simply call it thinking outside the box.

In *Portrait of an Addict as a Young Man*, celebrated literary agent Bill Clegg (his clients included *The History of Love* author Nicole Krauss and Pulitzer Prize finalist Susan Choi) detailed how he binged on crack cocaine to overcome an inferiority complex and feelings that he was an impostor among New York's accomplished literati. (Example: "I am not nearly as bright or well-read or business savvy or connected as I think people imagine me to be.") Over a period of a few years, Clegg lost everything, including his clients, his apartment, his partner, and his sanity. In the two-month binge during which he hit bottom, Clegg blew through some $70,000 on crack, Ketel One vodka, and pricey hotel rooms. He turned paranoid, convinced that cabs and helicopters were following him.

After writing a second memoir, *Ninety Days*, about his attempts to get sober, Clegg relapsed, but he has apparently righted his life again. He wrote two novels—2015's *Did You Ever Have a Family*, which was long-listed for the National Book Award and Britain's prestigious Booker Prize, and 2020's *The End of the Day*—and he has resumed work as a literary agent. "Recovery is an ongoing project that is really discrete from everything else in my life," he said in an interview during a book tour. "It allows me to be an agent, allows me to write, allows me to be married, allows me to be part of a family. The writing is not a support beam of recovery but a happy consequence of it." □

Battling the Odds

These celebrities have fought against their own addictions and have been vocal champions of the recovery journey.

By Courtney Mifsud Intreglia

Eric Clapton

In early 1982, despite having overcome a heroin addiction, Eric Clapton still had a serious alcohol problem. But the people around the musician would not call a powerful star out on his problems, with one exception: Clapton's manager, Roger Forrester. "He packed me up and sent me off to [the rehab facility] Hazelden. When I got to Hazelden, I had to sign this thing saying who is your significant other," Clapton told *Rolling Stone* in 2017. "Anyone else would have put a family member—or my wife. I was married. But I put him. Because he was the only one who would stand up to me and call me out." In 2013, Clapton told the filmmakers of the documentary *Beware of Mr. Baker* that getting sober saved his life. "I thought that if I stopped drinking and I stopped using drugs . . . I would not be able to play anymore," he said. "[But] my experience now tells me, in a long time of being in recovery, that I can be a good musician with or without that. . . . I wouldn't be here today—I'd probably be dead—if I hadn't gotten straight."

Robert Downey Jr.

"For some folks, it's just a function of age," the Marvel Cinematic Universe star told *Vanity Fair* in 2014 about overcoming his demons. "It's perfectly normal for people to be obsessive about something for a period of time, then leave it alone." When asked about the public incident in 1996 in which Downey's neighbors came home to find the actor passed out in their 11-year-old son's bed, he says it was "an uncommon occurrence for me. Happened to be a very public one. I was not a guy who blacked out." Police had earlier found heroin, cocaine, crack, and an unloaded .357 Magnum in Downey's car when he was stopped for speeding. He escaped from rehab twice and in 1999 served just under a year in jail. After two more arrests, he checked into rehab again and got clean. "Job one is get out of that cave. A lot of people do get out but don't change," said Downey. "So the thing is to get out and recognize the significance of that aggressive denial of your fate, come through some crucible forged in a stronger metal. So many things have become less certain. I swear to God. I am not my story."

Demi Lovato

Demi Lovato was suddenly hospitalized in July 2018 after an unspecified overdose. “I have always been transparent about my journey with addiction,” the singer wrote in a statement posted to Instagram that August. “What I’ve learned is that this illness is not something that disappears or fades with time. It is something I must continue to overcome and have not done yet.” Lovato opened up about her struggles with drug abuse and addiction in a 2017 documentary, *Simply Complicated*. In it, the singer shared that she started using cocaine when she was just 17 years old and on the Disney Channel. “I was with a couple friends, and they introduced me to it,” she said. “I was scared, because my mom always told me your heart could just burst if you do it, but I did it anyway. And I loved it.” Lovato’s journey has been complicated, but she’s working to get better. “I look forward to the day where I can say I came out on the other side,” Lovato wrote, adding, “I will keep fighting.”

Wynonna Judd

Throughout her more than 40 years as a recording artist, Wynonna Judd has had numerous addiction-rooted struggles. When, in 2003, her cholesterol put her at risk of a heart attack, the singer spoke about her emotional-eating issues for the first time to Oprah. Three years later, she checked into a treatment center for food addiction. “I was a people pleaser—I had trouble asking for what I need,” Judd told *People* in 2009. “I learned I can’t do it alone.” A year later, she told country-music website The Boot, “Reaching out for people, not food, was my greatest challenge. I was an isolating kind of person. And being more active was a challenge—forcing myself to show up when I didn’t feel like it, and being the participant in my recovery and healing. You have to be willing to step outside your comfort—not use food, but call somebody instead.” When her daughter, Grace Pauline Kelley, was sent to prison in 2018 at age 22 for meth-related charges, Judd became an advocate for criminal-justice reform.

Bradley Cooper

When Bradley Cooper headlined and directed the 2018 remake of the classic movie *A Star Is Born*, the actor's painful past paralleled his character's arc. "The stories that exist in this story, it comes from a very deep personal place, and that's the only way that I know how to communicate with many people," the actor told the *New York Times* during an interview about the film. In 2012, Cooper told the *Hollywood Reporter* that he had been sober for eight years. He said in the interview that the effects of his drug and alcohol use became unbearable, referring to an incident in which he intentionally smashed his head onto a concrete floor during a party, which led to stitches. "I don't drink or do drugs at all anymore," he said in the interview. "Being sober helps a great deal." In *A Star Is Born*, Cooper played an alcoholic musician named Jackson Maine who struggles with fame. "Anytime you're trying to tell the truth, you need to go to places and use things that have happened to you, or that you've read about or experienced," Cooper told *Variety* in 2016. "And that's all part of the beauty of turning whatever things you've gone through into a story. I find that to be very cathartic. I remember learning that in grad school—our teacher said all the insecurities, all the dark stuff, you get to use that, and that's really the truth."

Edie Falco

In *Nurse Jackie*, Edie Falco played an ER nurse who is addicted to pills before seeking sobriety by going to 12-step meetings. But the character was not Falco's first experience with addiction. The actress had struggled with it herself in the early 1990s. "I was drunk all the time!" she told *New York* magazine in 2008. "My life was an absolute mess, and I was hanging out with very scary and dangerous people and behaving in ways that I was horrified by. And after one particular night of debauchery, where I woke up—I won't get into it. But I realized, OK, I'm done." Falco drew on that experience in *Nurse Jackie*, saying she was fascinated with all of the facets that surround an addict's life: "the helplessness around [addiction], and learning to deal with that, and all the various 12-step programs I've been a part of over the years, and how much they've helped me."

Gladys Knight

Gladys Knight, the "Midnight Train to Georgia" singer and Rock & Roll Hall of Fame inductee, said in an interview with the *Los Angeles Times* in 2011 that she had once been powerless to stop her gambling addiction. "Winning is how they get you," she said. "Because you think you'll win everything, and you won't . . . I had gotten $2,000. And within 25, 30 minutes, I had won 60 grand. And I sat right at that table and gave every dime of it back. And I just got sick at the table." Right after leaving the card table, Knight called Gambler's Anonymous and got help. "The lady on the phone said, 'Where are you? We'll come get you.' That was about 15, 20 years ago. And I went to one meeting. That was all I had to go to."

Elton John

Despite being clean for more than 35 years, singer and pianist Elton John is still haunted by his drug- and alcohol-fueled past. “I still dream, twice a week at least, that I’ve taken cocaine, and I have it up my nose,” John told NPR in 2012. “And it’s very vivid, and it’s very upsetting, but at least it’s a wake-up call.” Throughout the 1970s and ’80s, the exuberant rock legend lived life through a drug-altered haze. The performer credits his sobriety to meeting Ryan White, a teenage hemophiliac who had contracted HIV through a contaminated blood transfusion. “I had the luck to meet Ryan White and his family,” he said during a Harvard University talk in 2017. “I wanted to help them, but they ended up helping me much more. Ryan was the spark that helped me to recover from my addictions and start the AIDS foundation. Within six months [of White’s death], I became sober and clean, and I have been for 27 years.”

Michael Phelps

As part of the 2018 Kennedy Forum in Chicago addressing depression, suicide, and mental illness, swimmer Michael Phelps spoke with political strategist David Axelrod about coming to terms with his depression and related substance abuse. “Really, after every Olympics I think I fell into a major state of depression,” said Phelps when asked to pinpoint when his trouble began. He noticed a pattern of emotion “that just wasn’t right” at “a certain time during every year,” around the beginning of October or November, he said. “I would say ’04 was probably the first depression spell I went through.” That same year, Phelps was publicly charged with driving under the influence. In the fall of 2008—weeks after he’d won a record eight gold medals at the Beijing Olympics—a photo surfaced of Phelps smoking from a bong, behavior he later described as regrettable. Drugs were a way of running from “whatever it was I wanted to run from,” Phelps said. “It would be just me self-medicating myself, basically daily, to try to fix whatever it was that I was trying to run from.”

Terry Crews

In 2016, actor Terry Crews revealed in a Facebook post that he had once entered rehab to treat a porn addiction after wife Rebecca King-Crews threatened to leave him. “Some people say, ‘Hey, man . . . you can’t really be addicted to pornography.’ But I’m gonna tell you something: If day turns into night and you are still watching, you probably have got a problem. And that was me,” the *Brooklyn Nine-Nine* star said. “It changes the way you think about people.”

Jamie Lee Curtis

The *Halloween* actress, who has been sober for more than 26 years, hid her addiction to painkillers for a decade. "I was ahead of the curve of the opiate epidemic," Curtis told *People* in 2018. "I had a 10-year run, stealing, conniving. No one knew. No one." The Curtis family has a long history of struggles with addiction. Jamie Lee's father, actor Tony Curtis, abused alcohol, cocaine, and heroin. Her half-brother Nicholas Curtis died from a heroin overdose in 1994. Curtis started her recovery in 1999 and opened up about her addiction to her husband, actor Christopher Guest, the same day she went to her first recovery meeting. "I'm breaking the cycle that has basically destroyed the lives of generations in my family," Curtis said. "Getting sober remains my single greatest accomplishment . . . bigger than my husband, bigger than both of my children, and bigger than any work, success, failure. Anything."

Rob Lowe

In May 2023, Rob Lowe marked his journey to sobriety with an inspiring message on Instagram: "33 years ago today I found recovery and a tribe that has sustained me on my incredible, grateful journey. My life is full of love, family, God, opportunity, friends, work, dogs, and fun. If you or someone you know is struggling with any form of addiction: Hope and joy are waiting if you want it and are willing to work for it!" The *9-1-1: Lone Star* actor has talked openly about his struggles since deciding to get sober at the age of 26, including how he problematically replaced his substance addictions with excessive exercise. "It became an outlet for all of the tension, stresses, compulsivity," Lowe told *Men's Health*. "I funneled the addiction, frankly, into that." He was awarded the Brent Shapiro Foundation's Spirit of Sobriety award in 2015 for being alcohol- and drug-free for 25 years. Lowe said upon being presented with the award: "Being in recovery has given me everything of value that I have in my life. . . . It's given me a beautiful family and an amazing career. I'm under no illusions where I would be without the gift of alcoholism and the chance to recover from it."

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The Science of Addiction

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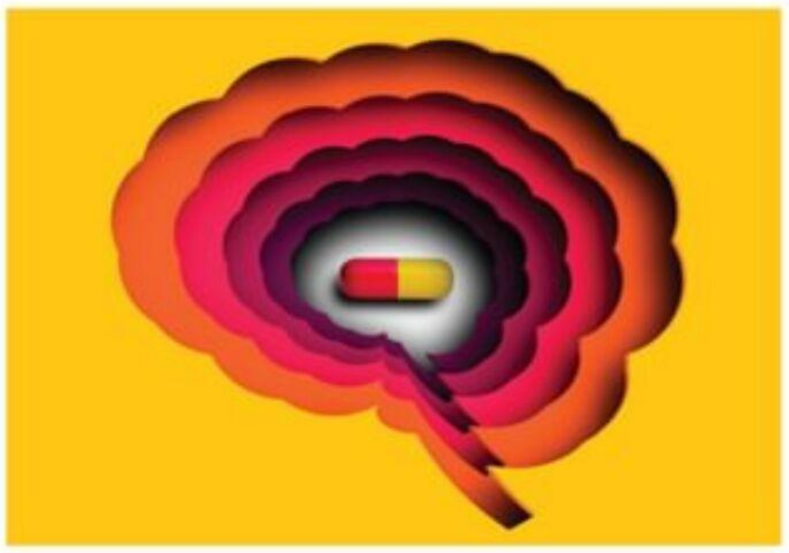

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STARTLING FIGURES

More Americans are touched by addiction than ever.

5.9%
of middle and high school students vape

More than
48
MILLION
Americans battle a substance-use disorder

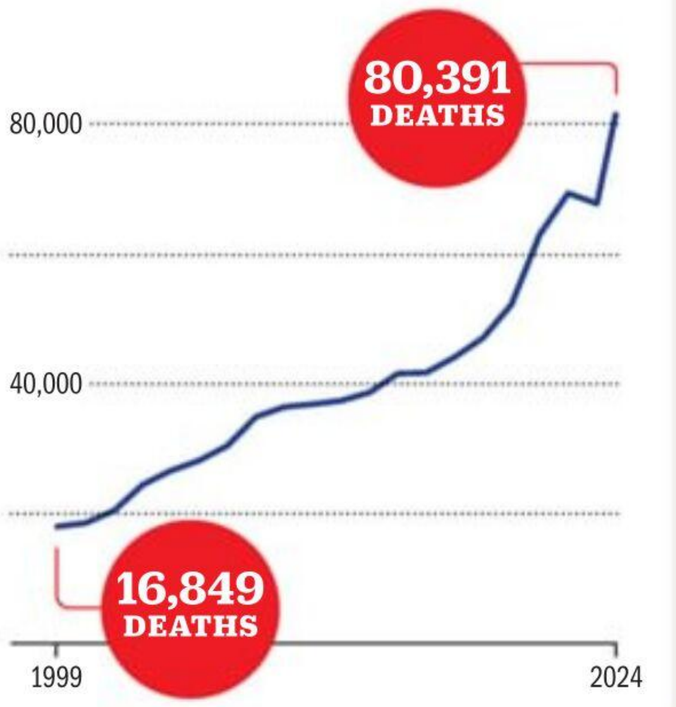
90%
of adults with addiction began to use drugs or alcohol before age 18

Alcohol:
28.9 MILLION

Illicit drugs:
27.2 MILLION

150
PEOPLE
die every day from an opioid overdose (2024)

National Drug Overdose Data shows deaths have drastically increased since 1999



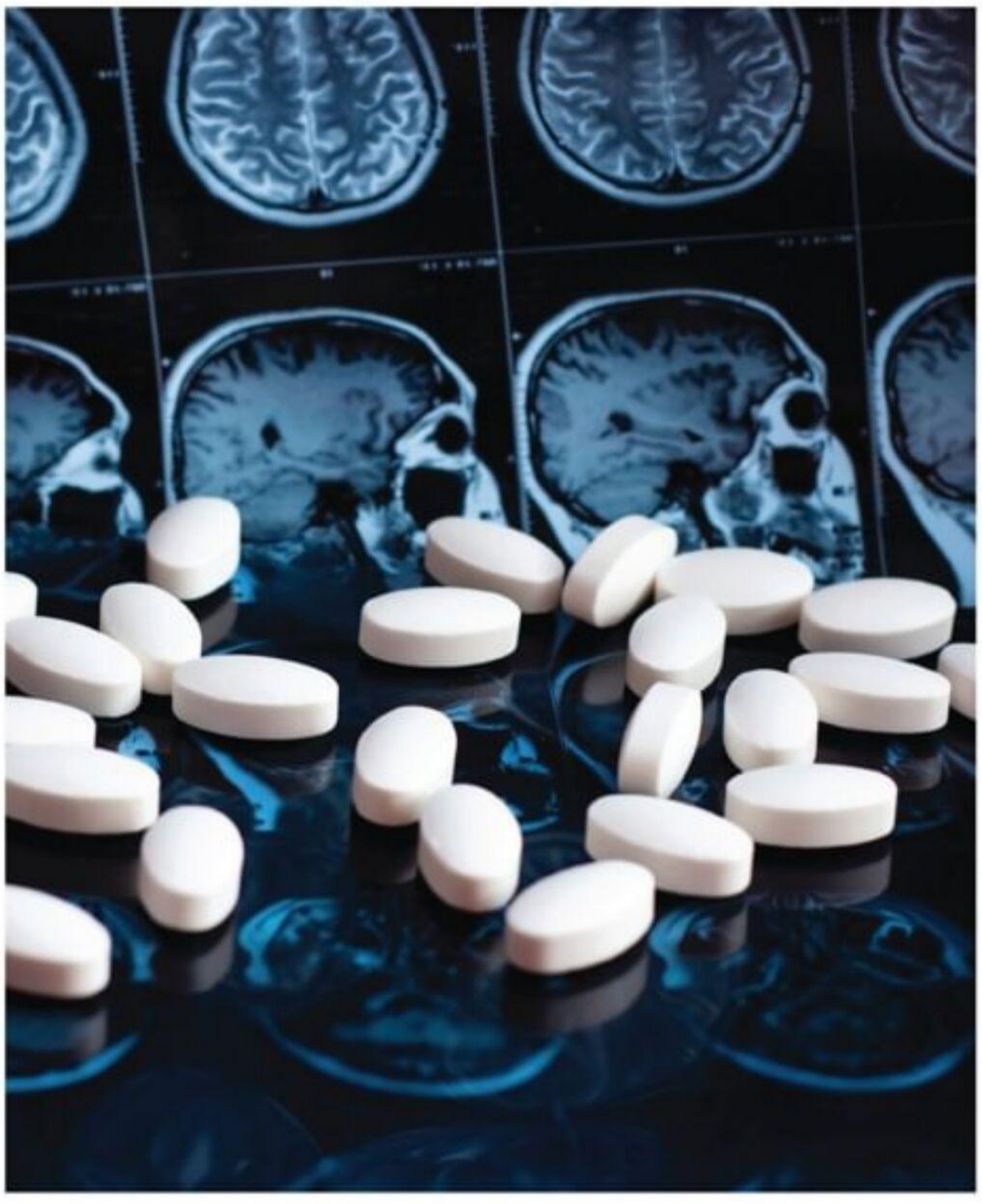
20%
of people who die from opioid overdose got the drugs through a legal prescription

42%
of participants in Alcoholics Anonymous remain sober after a year

560
PEOPLE
begin using methamphetamines every day

People with alcohol use disorders are
2,300%
(*or 23 times*) more likely to develop a gambling addiction

HELP IS OUT THERE

If you or someone you know is struggling with addiction, don't wait. Find treatment programs at **findtreatment.gov,** or speak with a trained counselor confidentially at **(800) 662-HELP (4357).**

The rise in addiction has had an impact on so many lives and families. It has also led to a rise in knowledge, compassion, and hope.